JULY 4, 1955 NEWS ISSUE

Electrical World

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Henry B. Sargent to leave presidency of Arizona Public Service Co. to become president of American & Foreign Power Co.

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NEWS ABOUT PEOPLE

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Why CEI Reconductors Lines To Boost Capacity

E B POWER
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GS N 12

LATEST POWER CIRCUIT BREAKER development is the new 750-mva metal-clad unit which offers a 50% increase in capacity with only a 6% increase in floor space. New unit will help combat problem of lack of sites when new substations must be built or existing ones up-rated.

Metropolitan load growth squeezes substation sites

New 750-mva, 13.8-kv breaker designed to pack more capacity in smaller area

Facing many electric utilities is the problem of how to serve the concentrated load in metropolitan areas. The same economic growth which builds load in these areas is reducing rapidly the number of available substation sites—and making remaining locations extra costly. Naturally, serving this load means higher interruption capacity which previously has required relatively bulky equipment.

HIGHER CAPACITIES

To battle this problem, General Electric has designed new substation equipment which will help utilities get more capacity in existing substations and in new ones; more capacity per square foot.

NEW BREAKER

Typical of G-E engineering accomplishments is the first 750-mva, 13.8-kv Magneblast breaker and metal-clad switchgear which has successfully passed final design tests at G.E.'s High-capacity Switchgear Development Laboratory and is to be shipped in early 1956. Rated 1200 and 2000 amperes, the new metal-clad unit will represent a 50% increase in interrupting capacity over present 500-mva equipment, with only a 6% increase in floor space.

For system planners, such developments as this by General Electric offer new tools for meeting the ever-important challenge: the right combination of the right apparatus to ensure the most economical supply of power. General Electric Company, Schenectady 5, New York. 301-302

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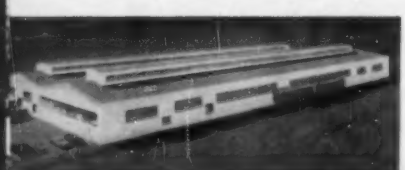
• • •

COMING NEXT WEEK—How power plant efficiency and economy can be improved by incorporating gas turbines in the steam cycle in different ways.

ANACONDA EXPANDS IN ALUMINUM

Reduction plant of the Anaconda Aluminum Company at Columbia Falls, Montana, is soon to give Anaconda control over its aluminum production from reduction of alumina . . . to ingot . . . to finished product.

A new reduction plant — a new modern rod mill — five separate aluminum fabricating mills — an engineering organization with years of experience in industry problems — *all* assure completely integrated service for users of the white metal!



Newest in the United States is Anaconda's modern aluminum rod-rolling mill at Great Falls, Montana. In addition to rod mill, the building houses the latest wire drawing and stranding equipment.

Anaconda's five aluminum wire and cable fabricating mills today have two new big brothers.

One is the imposing new plant shown above—Anaconda Aluminum Company's new reduction plant at Columbia Falls, Montana. It will provide Anaconda with its own major source of primary aluminum — 120,000,000 pounds of the white metal a year.

The second is Anaconda Wire & Cable Company's new aluminum rod-rolling mill at Great Falls, Montana (below). This mill is the most advanced in the country. It is completely automatic.

Today, Anaconda's five strategically located aluminum wire and cable mills . . . together with Anaconda's national *network of distributors* . . . make certain you get the aluminum wire and cable you want — *where* and *when* you want.

Quality products are a tradition with Anaconda. The most modern aluminum facilities in the country are backed by long years of experience with *many* metals . . . with *all* types of transmission and distribution wire and cable.

For all your aluminum wire and cable . . . for the highest quality aluminum products today . . . for engineering assistance at every stage . . . you can look with confidence to Anaconda. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York. 55074

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Bare aluminum • ACSR • Neoline* weatherproof • Duraline* weatherproof • Braid weatherproof • Polyethylene line wire • Type K service drop • Type N-SD service drop

EDITORIALS

"A Well Informed Public . . . Our Best Hope"

"A well-informed public is our best hope for fair treatment." This excerpt from Electrical World's recently-published interview with Harllee Branch, Jr, new president of Edison Electric Institute, has wide support in the industry.

Other speakers on the EEI convention program expressed the identical thought in various ways. Louis V. Sutton, president, Carolina Power & Light, put it this way: "My belief that a large majority of the public wishes to support rather than destroy free enterprise is based upon the premise that an informed public will render a fair verdict." Former EEI President Harold Quinton said, "Only the American People, informed and purposeful, are big enough and strong enough to exert the influence required to correct legislation that is harming their best interest."

Kinsey M. Robinson, Board Chairman and President of Washington Water Power, put it yet another way: "So again, may I caution and warn this assembly that we must make greater effort to take the public into our confidence. We must in some manner learn their wants and their desires and meet them more than half way. To my knowledge, that is the only way our part of the American system can be made secure."

As statements of policy, few people in the industry will take exception to these. But something is lost in implementing this policy. Top management, hard pressed to meet the growing demands for all kinds of public service, sometimes fails to give the necessary attention to informing the public on matters of importance. Numerous proposed statements to the press are sidetracked because of unwieldy procedures and lack of attention.

Electric companies, especially those off the firing lines, tend to think of their business in terms of other industries when it comes to meeting and informing the public. Other industries may have and guard their trade secrets, their rate of production, and prices. Electric companies have no such secrets. All pertinent figures are available in the public records.

But this situation does not relieve utilities' management of the responsibility of promptly and fully informing the public of its accomplishments, its problems, and its hopes. It must translate the figures in commission documents in terms the layman can understand. It must tell its story when there is still news value in it.

Electric companies must find more effective ways of implementing the policy so dramatically stated by Branch, Sutton, Quinton and Robinson. For as Branch said, "We have just not succeeded in getting our story across to the public. Too few people have sufficient information on our industry to evaluate fairly the arguments made by those who preach the gospel of federal power."

Power Plant Pathways to Explore

Power plants today present more challenging problems and greater rewards for the solutions than at almost any comparable period because of a variety of innovations now available. Few of these innovations are due to the advent of supercritical pressures or of nuclear reactor competition. Standing on their own legs are several opportunities resulting from such factors as: stringency of sites, rising costs, need for pure water, technological improvements in gas turbines, and a general disposition to take less for granted and more for exploration.

For example, pressurization of combustion has moved nearer the day when the gas-turbine cycle can be merged with the steam cycle for better thermal economy. As units get bigger in rating the sizes of auxiliaries rise. Maybe the orthodox motor driver for boiler feed pumps will soon be supplanted by the now non-orthodox gas turbine. Or perhaps economics will return the small steam turbine to favor for this day. Cooling towers are foreign to most systems in the populous industrial East, but more will be needed to meet the exigencies of condensing water supply near the load. It would seem wise to study their performance.

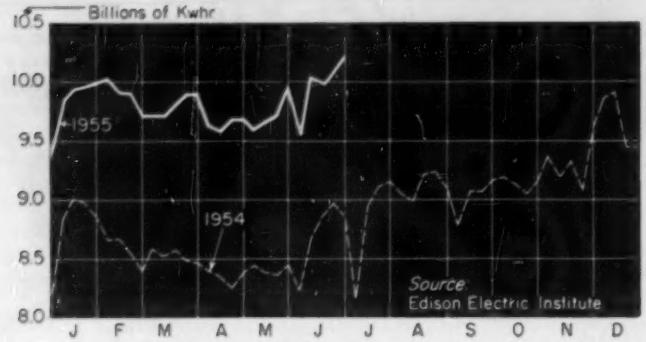
Small systems with small plants may not have to be concerned with these specific issues but the intermediate size utilities are rapidly adopting large units either on their own or in reciprocity with neighboring interconnections. The groups that study those interconnection benefits can well turn some of their sessions into forums on the points enumerated because everybody in a pool gains or loses by the astuteness of design of the plants on whose output and dependability they all rely.

Welcome Students

Many budding engineers, now preparing for their senior year in college, are working this summer in electric utilities. Their experiences and associations during these three months will help them to determine more intelligently the future course of their career. The financial compensation may benefit them during the coming school year.

Electric utilities which have hired these students have done so with the hope that the work will prove attractive and they will return for a full-time job following graduation. Many of these summer work programs have been designed to acquaint the student with several phases of utility operations and planning. He contributes to some of the immediate tasks at hand and at the same time gains some knowledge of the overall opportunities.

But if these students are to chose a utility career it is likely that they will base much of their decision on their direct associations with their fellow workers. If those associations are pleasant, chances are much better that this year's student will be next year's utility engineer. Because the industry is in need of young, competent engineers, it behooves us all to give the students a hearty welcome, and the help that will make them want to come back.



OUTPUT

Week Ended June 25

10,226,000,000 Kwhr

Up 13.9%

Atomic Energy Commission requirements — 845,000,000 kwhr (Electrical World estimate). Excluding AEC, output increase was 8.7%

Per Cent Change from Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
June 25	+13.9	+7.8	+11.3	+20.5	−0.6	+21.8	+0.6	+8.6	+13.3	+6.4
June 18	+12.8	+8.5	+9.1	+17.7	+0.3	+21.3	−1.5	+9.1	+9.5	+10.7
June 11	+16.0	+10.2	+10.2	+23.5	+4.5	+23.8	+4.9	+10.3	+7.7	+13.3

Seasonally Adjusted Index 194.8 Week Ago 192.4 Year ago 172.1

The Issue's Highlights: Hoover Commission recommends drastic curtailment of federal power but not its destruction . . . Pres Henry B. Sargent of Arizona PS leaves to become president of American & Foreign Power . . . Kefauver charges Administration with attempting to cover up role played by Adolphe H. Wenzell in Dixon-Yates contract; Budget Director Hughes denies charge . . . New government study of nation's probable wartime power needs is expected.

Carolina P&L has told Interior Department that it accepts "in principle" the proposed contract for wheeling Kerr Dam power. Some details of the proposal should be discussed, however, says Pres Louis V. Sutton. Contract provides that government sell power directly to preference agencies. CP&L will meet shortages to these agencies during dry periods . . . Legislators from Fairfield and Union Counties will ask 1956 South Carolina General Assembly to repeal 1934 act creating Lyles Ford Tri-County Power Authority because its existence is blocking industrial development in state.

NRECA stubbed its toe when it charged in its weekly news service that Arkansas Valley G&T co-op had made certain deals in obtaining its recent $3.5 million loan from REA. AVG&T Pres James N. Myers and Manager Edward Gaither wrote NRECA Pres Jack Smith that the charge "is completely false." Smith has apologized to the co-op for the article.

Washington state has filed brief listing 11 exceptions to initial decision of FPC examiner in recommending that Idaho Power be authorized to build Brownlee Dam on Snake River. Brief says decision fails to take into consideration place of steam in conjunction with hydro. At same time, brief is opposed to federal high dam at Hells Canyon, saying these (federal) "concrete monuments . . . contribute very little more in form of power, navigation, irrigation, or flood control benefits."

Petroelectric turbine generator, taking advantage of flowing petroleum instead of water, will supply power for Arica, Chile, a city of about 30,000. The 75-kw unit will be installed in petroleum pipeline to take advantage of 15,000-ft drop . . . Sweden has begun construction at Stenungsund of world's largest underground steam generating station. The 150,000-kw plant will be 300 ft underground in solid granite.

Connecticut L&P is planning unique design for proposed $20-million steam generating plant on Manresa Island in Norwalk harbor. Pres Sherman R. Knapp says company plans to make installation "best looking electric generating plant in Amercia." Hearings opened last week before PUC on CL&P's application to build plant. Considerable local opposition exists to building plant on the island.

NEWS OF THE INDUSTRY BRIEFLY TOLD

Off the Washington Wire: Senate Appropriations subcommittee has approved House-passed bill giving TVA $6.5 million to build transmission line to Mississippi Valley Generating plant. Meanwhile, Sen Estes Kefauver (D-Tenn.) continued his quibbling search for something wrong with the contract (See p 10). But President Eisenhower directed Budget Bureau Director Rowland Hughes to bar his files to Kefauver's anti-monopoly subcommittee which is holding hearings on the contract . . . House Interior Committee has approved Upper Colorado Project without Echo Park Dam . . . AEC has issued new regulation requiring written examinations for operators of atomic plants . . . Senate Interior Committee has voted to authorize ten Missouri Basin states to enter water compact.

North Little Rock has increased its offer from $40,000 to $52,500 for Arkansas P&L's electrical distribution system in the Amboy area. Company has been asking $60,000 plus $2,500 for utility poles it might have to replace. Town is offering $100 for each pole . . . Missouri P&L has received PSC approval to buy a Franklin county electric utility for $49,014. The smaller unit serves 268 customers.

Private and public utilities, and various other groups in Washington state are holding series of meetings to work out a revised electrical code for state. John Albi, Seattle City Light, chairman of group, says existing code is "wholly inadequate."

AIEE summer meeting in Swampscott, Mass., last week heard C. G. Suits of General Electric discuss developments resulting from new scientific research into materials of engineering value. He described a corona resisting rubber which can withstand for hours stress that would destroy other rubber in minutes. Perfect metal crystals, he continued, offer promise of greatly improving mechanical strength, up to 1 million psi. In addition to electing Morris D. Hooven of Public Service E&G the new president, AIEE named these vice presidents: Bradley Cozzens, Los Angeles Department of Water & Power; Evan R. Jones, Mountain States T&T; William J. Miller, University of Alabama; Cullen T. Pearce, Westinghouse Electric; and B. G. Ballard, National Research Council of Canada. New directors elected were: J. D. Tebo, Bell Telephone Laboratories; Paul F. Wallace, Texas P&L; and John C. Woods, Commonwealth Edison. For comments by A. C. Monteith, outgoing president, and Hooven, see below.

ABOUT PEOPLE IN THE INDUSTRY

AIEE's outgoing Pres A. C. Monteith said "we can confidently expect that the electrical industry will double in the next ten years. A parallel increase in complexity can be expected to require doubling number of engineers employed by the industry. With potential of 100,000 members, Institute must do its planning for the future now if it is to maintain and improve its position of leadership." On question of selecting new headquarters site, he said position was "very confused" and no action had been taken.

AIEE's incoming Pres Morris D. Hooven of Public Service E&G had his eye firmly on the needs of young engineers as he took office. "Today we must look to the young engineer to handle the complexities of our developing art. We must train him quickly and well and develop fast acting channels of communication to give him information he needs. We must analyze the profession as a whole and see that electrical engineers spearhead the approach of engineers to the advancement of society."

More News About People Page 36

Hoover Commission Recommends:

- Increase public power rates to overall competitive level
- Leave hydro power projects to private, local development
- Set up board to clear federal proposals, stiff standards
- Sell a fair share of federal power to the private utilities
- Encourage private participation in multipurpose projects
- Cease federal construction of steam-generating stations

TASK FORCE CHIEF MOREELL

Curtail federal power but don't wipe it out completely, the Hoover Commission recommended last week.

Government power would lose its big edge as a subsidized competitor. But the federal agencies would hold on to their present power facilities and retain the management of future partnership dams. Congress and the President must accept the suggestions of the Commission report on water resources and power to put them in effect, however.

Advice to the Government

This much the Commission advises the government to do:

(1) Cease construction of steam plants.

(2) Put the Federal Power Commission in charge of rates for government power, and make those rates high enough to include not only amortization with interest but also payments in lieu of taxes to state and local governments, plus an increment to equal federal tax exemption.

(3) Sell a fair share of federal power to private utilities.

(4) Leave hydro power sites to development by private utilities or local entities.

(5) Invite private enterprise to provide capital for power components of federal multipurpose projects or, failing that, to contract for the power in advance of construction.

(6) Set up stiffer standards for economic justification of such federal projects.

(7) Clear all federal proposals through a new Water Resources Board in the Office of the President.

These ideas, if adopted, will go a long way toward shutting off further growth of federal power and raising government power rates to a fair competitive level, with overall benefit to the national budget and the nation's taxpayers.

But the proposals fall short of the all-out suggestions previously voiced by Herbert Hoover and Adm Ben Moreell, chairman of the Commission's Task Force on Water Resources and Power. These recommended that the government get completely out of the power business by selling all its power facilities to private enterprise or to state or local public agencies.

Hoover had advanced this housecleaning proposal in public speeches even before he took over as head of the second Hoover Commission two years ago.

Moreell had made it clear that the task force wanted the same thing when he told the American Society of Civil Engineers three weeks ago that "no additional federal power projects should be constructed" and that "a start should be made on disposing of federal projects to private industry or, if this is not feasible, to the states and local governments."

It will be another week before the full story of the task force stand can be told. The Commission expects that much delay in releasing the task force's three-volume 1,800-page report.

Moreell in the same speech also had forecast a moderate report by the Hoover Commission—that is what the report turned out to be—much less drastic than the public power proponents had intimated, but still strong enough to draw their criticism.

A dissent as long as the Commission's report — from Commissioner Chet Holifield, Democratic Congressman from California—assails the majority recommendations in detail for blocking the further development of public power. Minor dissents by two cabinet-level commissioners, Herbert Brownell, Jr, and Arthur S. Fleming, seem to be at variance with Administration policy.

Moreell had said that many of the Commission's recommendations "represent compromises between sound economic judgments and political expediencies." For that reason he foretold that some of the recommendations would be "such that I cannot support them."

Recommendations Paralleled

In a broad sense, the Hoover recommendations on water resources and power were backed up by the comprehensive report of another two-year-old advisory group.

The 25-member Commission on Intergovernmental Relations, headed by Meyer Kestnbaum as successor to Dean Clarence Manion of the Notre Dame Law School, agreed with the Hoover group that the prime need of the federal government in this field is a unified, consistent national water resources policy that will apply across the board to all agencies and their activities.

The Kestnbaum report also calls for a board of co-ordination and review to advise the President and Congress on natural resources.

Both reports give recognition to state and local laws. The Hoover Commission says the federal agencies should "take account" of the rights and laws of the separate states, while the Kestnbaum group explicitly states that the national government should

"observe" local laws governing inland waters.

Likewise, both bodies speak up for state representation on federal commissions or boards that investigate, plan, construct, or operate projects.

In its more detailed report, specifically addressed to water resources and power, the Hoover Commission made a number of significant proposals:

Local Responsibility—The Hoover report would shift financing to state, local, or private interests for all projects that don't have national importance. Further, it would encourage similar local financing of reimbursable costs—such as power and water supply—in federal projects with the federal government continuing to pay the bill for flood control and navigation components and part of the irrigation costs. Management of all government-built dams, however, would remain in federal hands.

In broader terms, the intergovernmental group makes a general recommendation that costs of multipurpose, basin-wide developments be equitably divided between the national government and the states.

Agency Functions—In sharp contrast with the 1949 report of the first Hoover Commission, the present group recommends no shift in the flood control and rivers and harbors functions of the Corps of Engineers. Instead, the civil works of the Army Engineers would be expanded by a transfer to the Corps of headwater dams that are now under the Soil Conservation Service of the Department of Agriculture.

No other shifts of agency functions are recommended. The Bureau of Reclamation and other construction agencies would continue to operate in their present spheres, subject to proposed co-ordination by the new Board of Water Resources.

Project Evaluation—For tighter screening of proposals and better evaluation of benefits and costs—severely criticized by the Hoover group—the report recommends strengthening of the professional staff in the Bureau of the Budget.

Tennessee Valley Authority—The Commission would limit the power expansion of TVA by its general restriction on building of federal steam plants with the accompanying suggestion that power needs be met by tying into adjacent power systems.

The group does recommend, however, that TVA finance future improvements by selling its own securities to the public, without subordinating the present federal investment. And the same financing recommendation is made for the six other federal power systems, all of which would operate as corporations.

Federal Power—Rates for sale of power from federal plants, the Hoover Commission declares, should be regulated by the Federal Power Commission. Further, the rates should be at about the level a private utility would have to charge—enough to amortize the investment with interest, plus an amount that equals federal tax exemption and also provides payments in lieu of taxes to state, local governments.

Private utilities would get a chance to buy a fair share of federal power. All federal power systems (Columbia River, Hoover-Parker-Davis, Central Valley, Missouri Basin, and Southwestern and Southeastern Power Administrations) would be set up as corporations under the government Corporation Control Act, just as TVA is now.

Agency Funds—Reclamation revolving funds should be abolished, the Hoover group says. Instead, federal agencies that have revenue-producing projects should pay all cash receipts into the treasury and receive an annual appropriation to cover expenditures.

Partnership Projects—Private enterprise should be permitted to furnish the capital for the power component of multipurpose projects, the Hoover report states, with the federal government to retain control of the dam. If private or local capital doesn't come forward to finance the power investment, the power itself should be offered for sale before construction is begun.

De-Authorizing Projects—Congress should withdraw the authorization of all projects which the Chief of Engineers declares obsolete or unsound, the Hoover Commission says. (There are some 300 projects, estimated to cost about $1 billion, that the Chief of Engineers has designated as inactive or deferred for further study.)

On the Cover:

Foreign Power's New President Henry B. Sargent

The election of Henry B. Sargent as president, chief executive officer, and director of the American & Foreign Power Co, Inc, effective August 1, was announced last week. Formerly, Sargent was president of Arizona Public Service Co.

W. S. Robertson, whom Sargent succeeds as president of American & Foreign Power, was elected chairman of the board. Robertson has been president since 1944 and has been associated with Electric Bond & Share Co since 1916. Electric Bond & Share owns about 54% of the American & Foreign Power's common stock.

Sargent also was elected president of Ebasco International Corp, the service subsidiary of AF&P.

After graduation from Tulane University in 1927, Sargent joined Mississippi Power & Light Co. In 1946 he resigned as vice president and general manager of MP&L to assume the presidency of a predecessor of Arizona Public Service Co.

Sargent is a director of American Institute of Foreign Trade, Stanford Research Institute, American Gas Association, and a former director of Edison Electric Institute. In addition, he is a vice president and director of Pacific Coast Electrical Association and chairman of the steering committee of Electric Companies Public Information Program.

(More News About People on page 36)

Dixon-Yates Contract Probed

. . . in Senate subcommittee hearings; Budget Director Hughes answers Kefauver, asserts Wenzell played only minor role

Congressional Democrats lashed out again last week at the Dixon-Yates contract. But they did little damage.

Senator Estes Kefauver (D-Tenn), a Tennessee Valley Authority supporter, led the attack in his capacity as chairman of a Senate judiciary subcommittee. He had Budget Director Rowland Hughes on the carpet.

For two hours Kefauver plugged away at one question: What part did First Boston Corp's A. H. Wenzell play in the Administration's decision to negotiate the Dixon-Yates contract?

He kept getting the same answer—one he didn't like. Hughes's reply in every case indicated that Wenzell's role had been minor. For he had been called in by the Budget Bureau to advise strictly on financial angles of TVA, and to point up its accounting and reporting system variances from those of private utilities. He had no part in the decision to contract with Dixon-Yates.

The argument developed when Tennessee Gov Frank Clement appeared before Congress and voiced the suspicion that something underhanded had taken place 18 months ago.

In testimony before a Senate appropriations subcommittee, considering TVA and Atomic Energy Commission funds for fiscal 1956, Clement indicated the Administration deliberately censored Wenzell's name from records which were to show the background of the Dixon-Yates plan: How it was born, who negotiated it and when, and who made the ultimate decision to sign.

Clement had indicated that Wenzell's part in the government's decision to buy 600,000 kw of power from Dixon-Yates was a major one. Without him, the theme went, perhaps some other firm would have got the contract, or perhaps the proposal to buy from private power companies would not have been made. The governor hinted that Wenzell's firm, First Boston Corp, had him planted in the Budget Bureau to arrange a juicy deal it could cash in on later.

BUDGET DIRECTOR ROWLAND HUGHES

Hughes testified that his records of Wenzell's appearances as a Budget Bureau consultant, and his denial that he had leaned on Wenzell's advice in making Dixon-Yates decisions, gave no indication of any such conspiracy.

The important point of the hearing, it seemed, was that the charge Kefauver tried to tee off never left the ground. He hoped the hearing would indicate deliberate censorship of the Administration's records of the contract negotiations. It did not.

Those in Washington who have watched the Democrats' strategy in the Dixon-Yates fight observed that Kefauver's hearing came at a crucial moment in the Senate Appropriations Committee's consideration of TVA's money bill for next year. The House has already approved an Administration request for $6.5 million in TVA funds to build a transmission link to the Dixon-Yates Plant. And the Senators have that bill before them now.

The fight continues elsewhere. The Dixon-Yates firm, Mississippi Valley Generating Co, is still seeking Securities & Exchange Commission approval of its debt financing plans. It wants to borrow about $100 million from a number of banks and insurance companies so it can build the 650,000-kw steam plant and keep its part of the bargain. Public power forces have tried their best to block this.

(*More News on page* 15)

DeBellis Awarded Lamme Medal

The 1954 Lamme Gold Medal was presented last week to Aldo M. deBellis, assistant electrical engineer of Consolidated Edison Co of New York, Inc, at the meeting of the American Institute of Electrical Engineers at Swampscott, Mass. He is the 27th AIEE member to receive the award for "meritorious achievement in the development of electrical apparatus or machinery."

Shown above at the presentation are (l to r) J. F. Fairman, vice president of Con Edison; A. C. Monteith, vice president of Westinghouse Electric Corp and retiring AIEE president who awarded the medal; DeBellis; and S. B. Crary, manager of analytical engineering, General Electric Co, and chairman of the Lamme Medal Committee.

DeBellis was honored "for his contribution to the design and development of power station equipment, especially isolated phase, high-voltage bus structures and disconnect switches." (For more on the AIEE meeting, see p 7.)

"Hold it, Bill!

We never scrap

POLE STAR

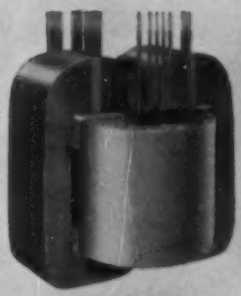
core and coil units...

It's more economical to repair or replace a damaged coil."

How right the man is! It's a relatively simple matter to remove the Pole Star core from the coils and then reassemble the entire unit. No special tools are needed. What is more, the core can be rebuilt with replacement coils without appreciably affecting the low core loss or low exciting current of the Pole Star.

Since there are no gaps or butt joints in the core, no mechanical clamping device is required to hold the core together. This outstanding construction feature of Pennsylvania Pole Star transformers allows the coil to be quickly and cheaply replaced if it is damaged by lightning or by being too heavily overloaded.

Core laminations are inserted into the coils, brought through, and individually lapped. No special tools are needed, and the annealed steel is not bent beyond its elastic limits.



Core and coils of Pole Star transformers form an integral unit and are self-supporting.

Pennsylvania Pole Star transformers are manufactured in sizes 3 Kva through 500 Kva and 480 volts through 67,000 volts.

Pennsylvania Transformer Company

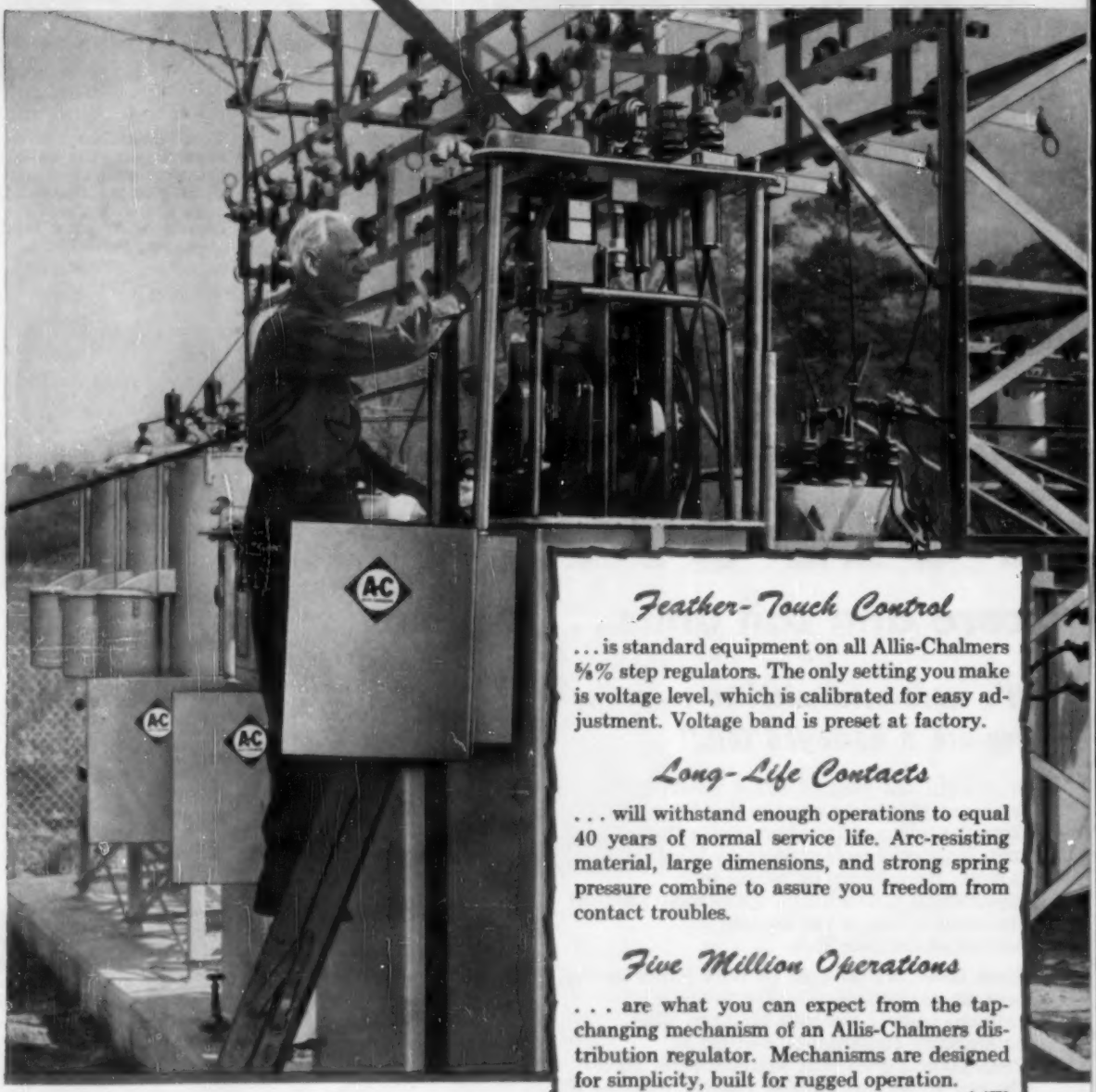
A McGraw Electric Company Division

CANONSBURG • PENNSYLVANIA

POLE STAR

pt

How Cover Regulator



Feather-Touch Control

. . . is standard equipment on all Allis-Chalmers ⅝% step regulators. The only setting you make is voltage level, which is calibrated for easy adjustment. Voltage band is preset at factory.

Long-Life Contacts

. . . will withstand enough operations to equal 40 years of normal service life. Arc-resisting material, large dimensions, and strong spring pressure combine to assure you freedom from contact troubles.

Five Million Operations

. . . are what you can expect from the tap-changing mechanism of an Allis-Chalmers distribution regulator. Mechanisms are designed for simplicity, built for rugged operation.

A-4770

ALLIS-

Suspension Saves Inspection Time

ALLIS-CHALMERS
5/8% STEP
VOLTAGE REGULATORS

Untanking a regulator is easy when its components are cover suspended. Use a truck crane, block and tackle, or this more convenient inspection jack. Designed for use with Allis-Chalmers regulators, it can be used to untank either distribution or single-phase power regulators. Jacks are available—see your nearby Allis-Chalmers office.

ROUTINE inspections are *really* routine when you have Allis-Chalmers single-phase voltage regulators on your system. It takes less time and less manpower to inspect an Allis-Chalmers single-phase regulator than any other regulator on the market.

Here's why! A-C regulators have all their components suspended from the cover when untanking. Just remove a few cover bolts and control cabinet mounting bolts. Then hoist up on the cover and the complete unit — tap changer, transformer and control — comes up into view. There are no leads to break; no oil to mess with.

You can operate the complete unit outside the tank. Just connect an external power source to energize the control. There are no special connections to make.

Conveniences like these come as the natural result of Allis-Chalmers experience in the design and manufacture of step regulators. No other manufacturer can match it. And no other manufacturer offers ⅝% step regulators that have given more than 20 solid years of utility satisfaction.

Get complete information. Call your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

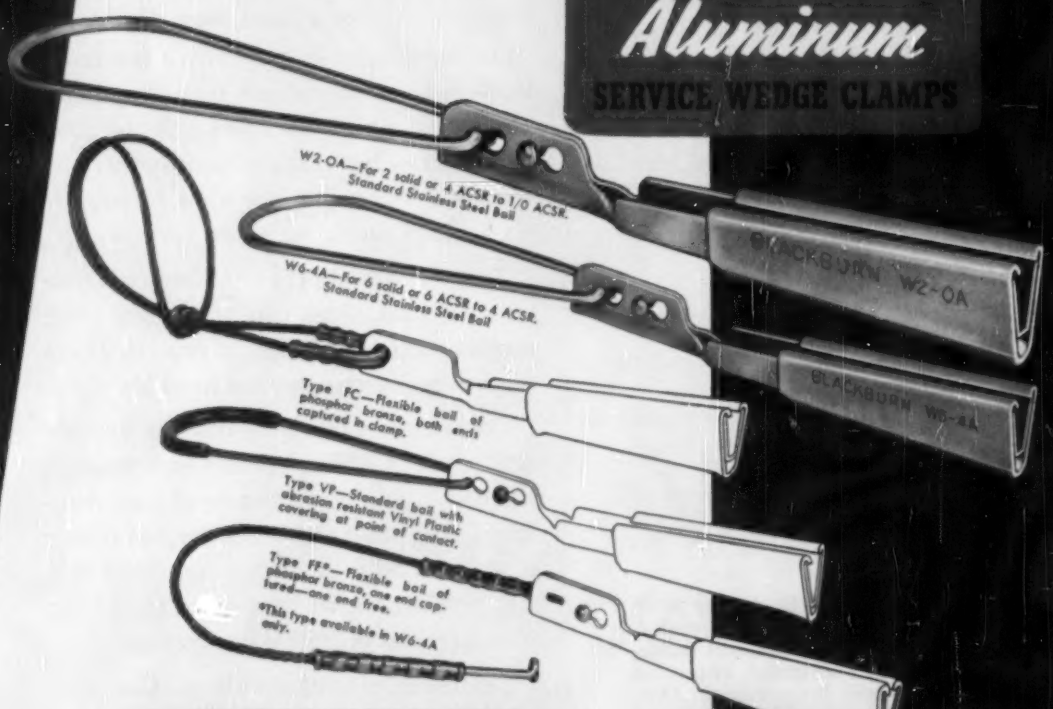
A-C ALLIS-CHALMERS

CHALMERS

NOW!

YOUR CHOICE OF 2 SIZES in . . .

BLACKBURN
Aluminum
SERVICE WEDGE CLAMPS


W2-OA—For 2 solid or 4 ACSR to 1/0 ACSR. Standard Stainless Steel Bail
W6-4A—For 6 solid or 6 ACSR to 4 ACSR. Standard Stainless Steel Bail
Type FC—Flexible bail of phosphor bronze, both ends captured in clamp.
Type VP—Standard bail with abrasion resistant Vinyl Plastic covering at point of contact.
Type FP*—Flexible bail of phosphor bronze, one end captured—one end free.
*This type available in W6-4A only.
BLACKBURN W2-OA
BLACKBURN W6-4A

ALL BLACKBURN WEDGE CLAMPS HAVE FULL GRIPPING SURFACE

—Conductor is in contact with the wedge for the entire length of the slider and, *they are easily installed.*

- **Removable aluminum slider allows clamp to be installed without threading through clamp.**
- **Drop wire can be pre-sagged and cut to exact length—saves conductor—saves time.**
- **Clamp can be attached to bare neutral at any point in the span.**

Available through electrical wholesalers everywhere.

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Utility-PUD Sale

Washington Water Power sells properties in two counties to Chelan PUD, ends dispute

Washington Water Power Co has sold its properties in Chelan and Douglas Counties to the Chelan County Public Utility District for $20 million. The sale includes the 48,000-kw Lake Chelan generating plant built in 1928.

The sale ends ten years of litigation between the company and PUD, following the PUD's first effort in 1945 to acquire the properties by condemnation. The case, frequently in lower courts of the state, had been considered five times by the state supreme court and once by the U. S. Supreme Court.

A stipulation filed in Chelan County superior court sets the price of the generating and distribution system in Douglas and Chelan counties at $20 million, plus materials, supplies, and accounts receivable. The exact price will be determined by inventory.

The PUD plans to pay for the properties by two series of bonds. It will allocate $18.5 million for the Chelan power plant, and $1.5 million for distribution facilities. Twenty former WWP employees will be invited to continue working for the public utility district, or WWP will absorb them in other jobs if they choose.

WWP-PUD Power Plan Included

The sale agreement includes a 40-year power contract between WWP and the PUD under which the district will sell surplus power from the Chelan plant to WWP. L. J. Richardson of Wenatchee, president of the district, pointed out that a recent amendment to the 1930 public utilities law of Washington, permitting sale of power to private utilities by public agencies, made the power contract possible.

"The commissioners are pleased that substantially all the distribution of electricity in Chelan county is now under our management," Richardson said. "We will see that the future and present electric needs of the area are taken care of promptly and efficiently."

In a prepared statement by President Kinsey M. Robinson, the WWP pointed out that the sale of its facilities "eliminates long and costly hearings." A trial to set the value of the properties had been scheduled to begin in superior court late in June.

Robinson's statement also said that "cash equivalent to that received from the PUD settlement can be applied to the cost of the 400,000-kw plant at Noxon Rapids on the Clark Fork River in Montana."

Washington Water Power estimated that approximately 2% of its gross revenues came from the Chelan-Douglas area.

Robinson later announced that WWP was calling $19,630,000 of its first mortgage bonds for redemption. Funds for the redemption would come from the $20-million sale of properties in Chelan and Douglas Counties.

Hawaiians Lunch in Island's New Plant

The group of Honolulu businessmen shown above moved their weekly lunch to the Hawaiian Electric Co's No. 8 plant. Afterward, they toured the $10-million installation which includes a 50,000-kw generator.

Prelims for Chelan's Dam

Site feasibility reports on the proposed Rocky Beach Dam on the Columbia River above Wenatchee, Wash., will be completed in September, the Puget Sound Utilities Council has been informed. Preliminary reports favor a site downstream from that originally proposed by the Army Corps of Engineers. Chelan County PUD will construct the project.

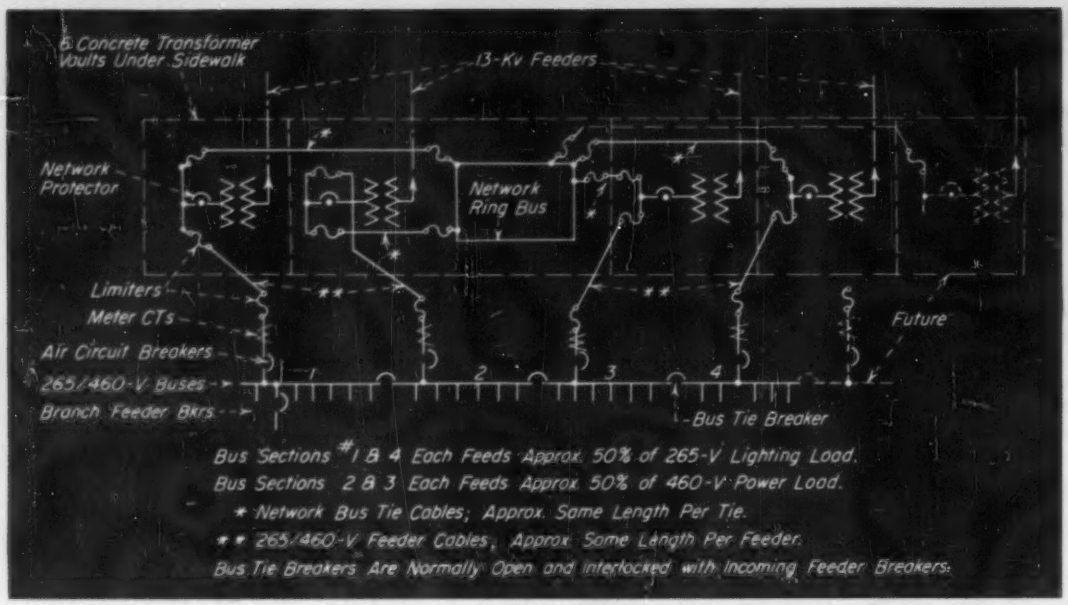
Careful Selection Urged For New Engineers' Site

Tenants of the inadequate, 50-year-old Engineering Societies Building in New York City have been urged by a newly formed group of engineering educators and industrial leaders to consider the long-range work of the societies, not local financial enticements, in choosing new headquarters. (See page 7.)

Tenants of the building are American Institute of Electrical Engineers, American Society of Civil Engineers, American Institute of Mining and Metallurgical Engineers, American Society of Mechanical Engineers, American Institute of Chemical Engineers, and United Engineering Trustees, Inc.

The group of educators and executives offered to sponsor a nationwide campaign to raise the $2.5 million required to relocate the organizations' headquarters. Their offer was accompanied by a suggestion that a "competent and independent management firms" be employed to study the problem of site selection with consideration for "the long-range interests of the societies in serving their professions and the nation."

(More News on page 20)


6 Concrete Transformer Vaults Under Sidewalk
13-Kv Feeders
Network Protector
Network Ring Bus
Limiters
Meter CTs
Air Circuit Breakers
265/460-V Buses
Branch Feeder Bkrs
Future
Bus Tie Breaker
1
2
3
4
Bus Sections #1 & 4 Each Feeds Approx. 50% of 265-V Lighting Load.
Bus Sections 2 & 3 Each Feeds Approx. 50% of 460-V Power Load.
* Network Bus Tie Cables; Approx. Same Length Per Tie.
** 265/460-V Feeder Cables, Approx. Same Length Per Feeder.
Bus Tie Breakers Are Normally Open and Interlocked with Incoming Feeder Breakers.

Multi-unit spot network for commercial building gains economy when . . .

Reactance Design Limits Fault Duty

HOWARD J. DONNELLY, Chief Electrical Engineer, Building Department, Upstate Area, New York Telephone Co, Albany, N. Y.

TRYGVE FORBERG, Detroit, Mich.

CHARLES I. MAUST, Consulting Engineer, Summit, N. J.

The best electric system for any industrial or commercial building holds short-circuit currents to conservative values while meeting required standards of voltage. It achieves this by use of multiple transformers tied to separate bus sections and paralleled by tie circuits. Careful design of these components provides reactance to meet the desired limits.

The resulting system has optimum reliability, permits proper maintenance and extension without overall interruptions, and provides selective breaker tripping at lower cost than cascade tripping on conventional modern systems. It uses the best equipment and materials to provide optimum protection to life, property, and electrical equipment. And it meets the requirements of each situation with lowest first cost and annual charges.

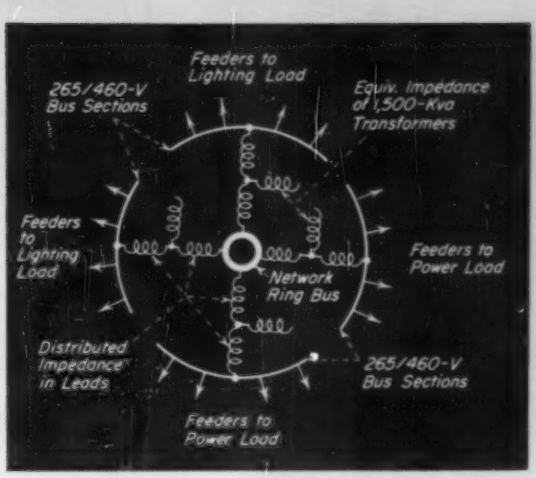
Coordination Is Basic Principal . . . The same basic principles of coordinated design of overall electric systems can be applied for industrial and large commercial buildings as utilities and engineering firms apply to major electric generation, switching and transmission systems. This is justified, especially when it only involves more thinking and not necessarily higher installed costs. Too frequently coordinated design is lacking, probably accounting for a major portion of the 3% per year upward trend of business, property and life losses in U.S.A. The approximate averages chargeable to electrical equipment are:

Property loss per year, $88,000,000
Fires per year, 75,000
Property loss of "unknown origin" part of which is probably electrical, per year, $225,000,000.
Time loss injuries per year of workers, 5,600
Deaths per year, 980
Loss per year of production and business, chargeable to inferior electrical systems, exclusive of losses occasioned by public utility difficulties, $2,000,000,000

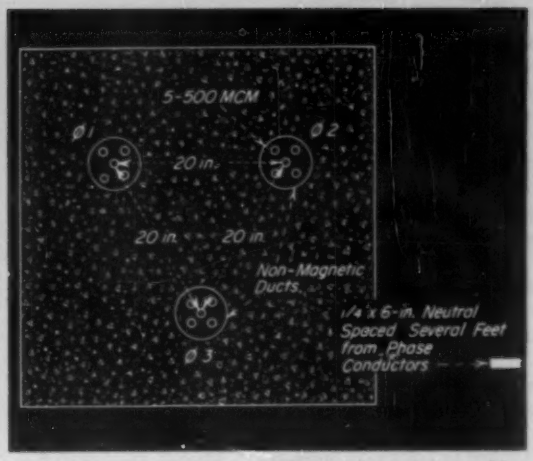
Provides Better System at Lower Cost . . . The ideal solution would be to provide major increased capacities without increasing fault currents and impairing voltage regulation, all at lower cost. Although this has not been fully accomplished, we have approached it with a new system we refer to as type "A."

A type "A," 265/460-v network was designed for an initial transformer capacity of 6,000 kva (for 3,500-kva load) increasing to 15,000 kva (for ultimate 8,700-kva load) with good voltage regulation at all stages of development. The initial and ultimate installed costs were less for the type A system than for the same thermal capacities in a conventional system. Fault currents on the load side of customer's feeder breakers beyond his main 460-v bus compared as follows:

	Fault Amp, Rms	
Kva of Trans.	Type A System	Conventional System
Initial		
6,000	48,000	120,000
Ultimate		
15,000	50,000	158,000



IMPEDANCE DIAGRAM OF SPOT NETWORK shows how distributed reactance limits contribution of each source to faults



REACTANCE IS BUILT INTO CABLE RUNS by isolating cables of each phase in non-magnetic ducts of predetermined length

Voltage regulation for the type A system is better than the minimum guide proposed in a recent AIEE paper.

Savings of more than $80,000 have been computed for a type A installation. It used standard equipment, without overstressing or overheating, while the conventional system of necessity would have permitted overstressing of some elements when subjected to short circuit. The type A system used selective tripping while the conventional system used cascade tripping of breakers. The cost differential would obviously be much greater if the conventional system had included selective tripping.

Balanced Reactance Is Key . . . The type A system has higher values of reactance in certain parts of the system so proportioned for each system as to provide the best balance of desired characteristics. The system is basically one of multiple transformer units, multiple feeders to the customer, and multiple bus sections. Proportioning reactances gives good voltage regulation, low fault currents, and lower first cost resulting from reduced interrupting duty. The success of the type A system is dependent upon providing proper values of reactances in the various branches and tie circuits of the system. This cannot be overemphasized.

Considerable care must be used in selecting the reactances of transformers, secondary leads, connections from transformers to the network bus and from transformers to the customer's bus sections. The values are influenced by the goal set for maximum allowable fault currents, voltage regulation under normal full-load, percent emergency service, requirements for automatic restoration, and preselected transformer outage conditions.

Isolated-Phase Cables Preferred . . . Reactances may take the form of series reactors, high impedance buses or bus ducts, or high impedance cable systems. All three types have been carefully considered and high impedance cable systems have been selected for their better reliability, lower cost, and greater flexibility. Isolated-phase cables in non-magnetic conduits is the design fundamental with which the safety and economy of the type A system is obtained.

Phase spacing, and length and type of cable determine the reactance of this portion of the circuit. Configuration, and location of phases in the configuration as in a equalateral triangular, circular, flat, rectangular, etc, affect the reactance and the distribution of current among the parallel cables of each phase. Phase spacing, configuration, and length of cables may be adjusted to obtain the most practical and economical installation. The equilateral triangle appears best for most cases in view of the near perfect balance of reactances and currents. Such balances, however, were obtained by the authors 25 years ago with other forms.

Reactors . . . Special and standard commercial reactors of several types and manufacture were considered in 1954. But isolated phase cables were selected because of:

1. Considerably decreased installed cost.
2. Decreased size of vaults.
3. Decreased cost and time of moving other related equipment in the vaults.
4. The number of different reactances and capacities required.
5. Greater confidence in ability to withstand extreme dirt and moisture of under-sidewalk, open grating, vault service.
6. Submersible construction required by some utilities.
7. More acceptable to utilities.
8. Less hazard to electric service.

Meets Industrial Requirements . . . This plan was developed for service to Procter & Gamble Co at Cincinnati from the local power company's 13-kv system. Design was based on initial load of approximately 3,500 kva, with provision for growth to approximately 4,300 kva. Allowance for adjacent loads developing in the distant future indicated ultimately having 15,000 kva of transformer capacity at or close to the site. The utility decided to use four 1,500-kva, 13,800-v, 3-phase, network transformers initially. These would be installed in vaults under the sidewalk and a separate network bus vault would be provided.

The customer's 460-v bus was planned to be in four sections initially for 3,500-kva load and five sections for 4,300 kva. Each bus section would be fed by one 1,500-

kva transformer and each transformer would also be connected to the power company's network bus. Tie breakers between customer bus sections would normally be open, but would close automatically when bus voltage drops below 92% of normal. This voltage is less than estimated full load voltage with two 13-kv feeders out of service, thus automatic closing is not essental. But the bus-tie breakers would permit continuous service to buses even with the main incoming feeder breaker disconnected for maintenance.

Delta-spaced, non-magnetic conduits with isolated-phase multiple cables were planned for all 460-v connections between transformers and network bus and between transformers and customer's buses. The spacing, conductor size and lengths were designed to develop the impedance values required to obtain 68½% reduction in fault currents while maintaining good voltage regulation.

Applied to Telephone Building . . . Another installation was developed for New York Telephone Co and is being installed at its Montgomery Street building in Syracuse, N. Y., with the approval of Niagara Mohawk Power Corp. All recommended features are not being provided because appreciable changes to the utility's existing facilities would be required.

Ultimately four 750-kva transformers will feed the 120/208-v network bus from 11.5-kv feeders. Each of the four transformer secondary circuits to the network bus will have distributed reactance built in. The customer's bus will be in two sections, each fed by one transformer. The bus sections are to be connected to a normally open bus-tie breaker.

The plan was developed too late to apply to a 4,500-kva installation at Buffalo for the New York Telephone Co. In retrospect, it is interesting to note that a type A installation there would have saved approximately $60,000, would have reduced fault currents to less than 50%, and would have permitted selective tripping of breakers instead of the cascade tripping installed.

Offers Advantages to Customer . . . Type A system reduces the I^2R fault energy to approximately 10% of the value for a conventional system. It thus reduces hazard to property and life, first cost of adequate protection by roughly $30,000 to $70,000 and annual charges by $5,000 to $13,000. The cost of service includes the cost of owning as well as operating and energy costs. Type A system minimizes the effects of faults and starting of larger motors on the customer's circuits and on adjacent services. It also permits full-voltage starting of larger motors at less cost and with greater reliability. Type A system permits power supply to be doubled or tripled with only a 2 to 4% increase of fault current. Cost of switchgear includes floor space, less of which is required by type A system in most cases.

In one design calculation, an increase in transformer capacity from four to five 1,500-kva transformers, raised fault current by only 1,200 amp. On a conventional system this increase would have been 19,000 amp. In another calculation, increasing the number of 1,500 kva transformers from five to ten boosted fault current 1,100 amp compared to 38,000-amp on a conventional system. In other words, a type A system avoids the rapid obsolescence which other systems develop even though designed with adequate interrupting capacity initially. An unanticipated heavy increase in nearby transformers may easily produce this result for the usual installation.

A type A installation can be engineered to permit planned maintenance of service entrance breakers while maintaining 100% service. Such breaker maintenance costs less because the breakers are never overstressed and do not require immediate inspection after each fault. Only one breaker is involved per fault as compared to two or three in a cascade scheme.

A type A system permits applying circuit breakers without overstressing them. It may also permit providing selective tripping at less cost than a conventional system with cascade tripping for the same load and power supply system. It is obviously preferable to provide selective tripping because only one breaker and one feeder or branch circuit is interrupted at times of fault. Application of breakers within their designed interrrupting duty avoids the need for current limiting fuses which lack selectivity for many heavy fault currents.

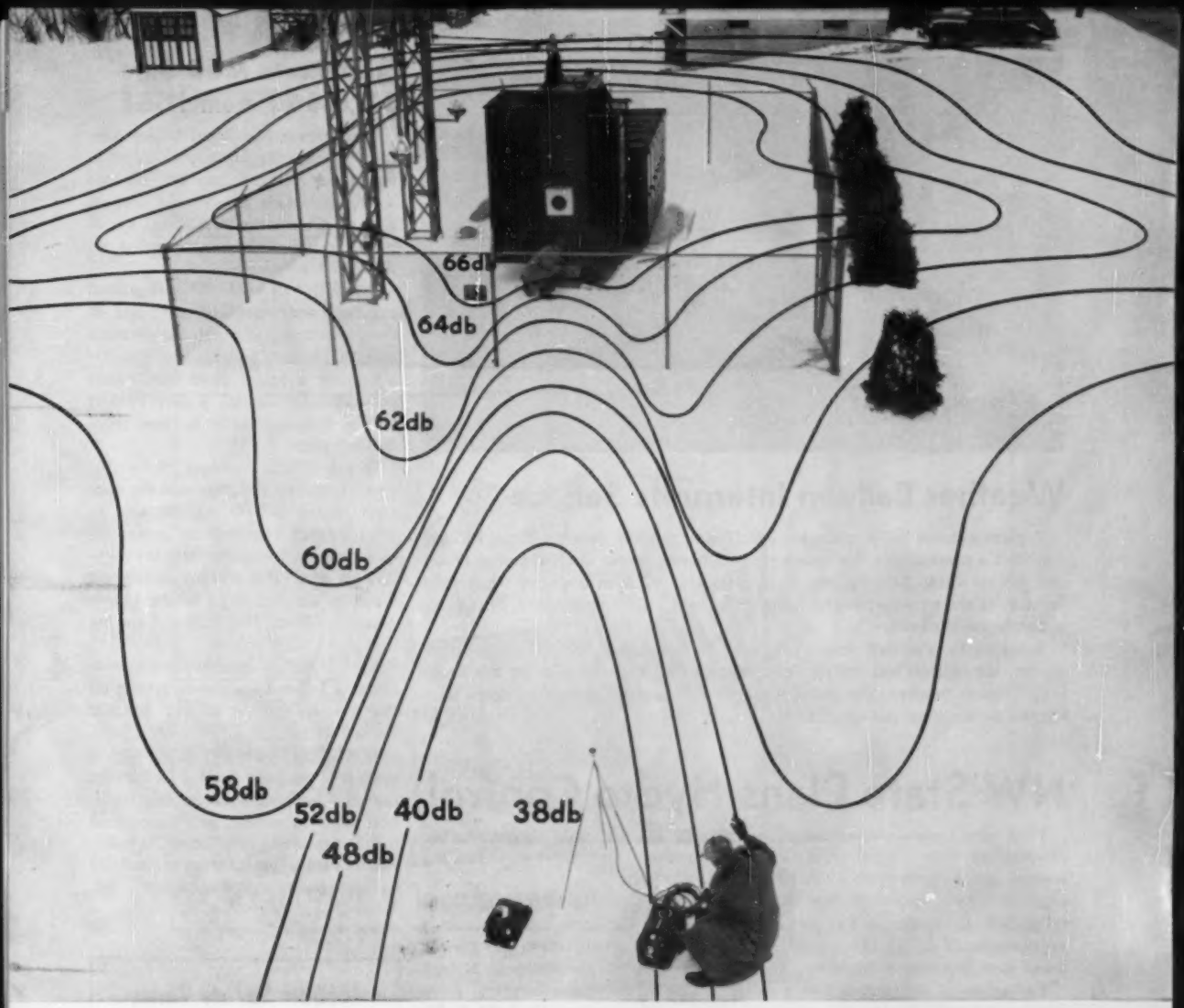
A type A installation will permit 50 to 80% of building service to remain energized when a main bus section failure occurs. It will permit continuity of service, possibly at some reduction in load, even if 20 to 40% of the entrance cable circuits are out. If desired, 100% automatic recovery upon loss of one service entrance feeder group can be provided. A type A system can be designed to maintain good voltage regulation under normal conditions and satisfactory regulation under second contingency circumstances such as loss of two primary feeders and the utility's voltage regulator.

Offers Benefits to Utility . . . Type A systems provide adequate protection at reduced overall cost to the consumer, thereby promoting increased power usage. Any design that reduces installed cost and thereby overall cost per kwhr, obviously encourages increased use of power. A type A installation sometimes effects a major economy to the utility. Last but not least, these systems can further promote good customer relations.

Eliminates Need for Larger Breakers . . . Circuit breaker manufacturers indicated to the authors in 1954, and again in 1955, that they had not expected to produce circuit breakers with guaranteed interrupting capacities greater than 100,000 rms. Recent announcements raised the rated interrupting capacities to a maximum of 150,000 rms amp without any announced changes in design. Some AIEE papers presented in October 1954 indicated that network-system low-voltage circuits can deliver fault current up to 170,000 amp. It is expected that reliable circuit breaker manufacturers will wholeheartedly support the type A or any other sound and economical system which can relieve utilities and customers of such heavy fault currents.

It is further understood that breaker manufacturers will be able to use breakers for many services where otherwise switches and fuses might be specified. Circuit breaker manufacturers have always been leaders of engineering advancement in circuitry and protection. The authors feel encouraged to predict their complete cooperation in sponsoring and disseminating information regarding economies, such as the above, for the benefit of the industry.

The authors wish to thank the customers for wholehearted support and utilities for complete cooperation in the development of the type A system.

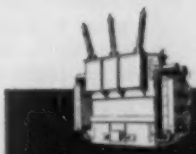


NOISE + NOISE = LESS NOISE

Sound cancellation—projecting a quiet zone through the complex sound field which surrounds a power transformer—may be an inexpensive solution to some transformer noise problems. Using loudspeakers and a relatively simple control circuit, G-E engineers have reduced transformer sound levels as much as 20 decibels within a 30° beam (noise energy reduced to 1/100 of its former value).

Here's how it works. A beam of sound with amplitude and major frequency characteristics identical to the transformer hum, ***but opposite in phase***, is aimed at the source of a complaint. These sound waves cancel each other... greatly reducing audible noise.

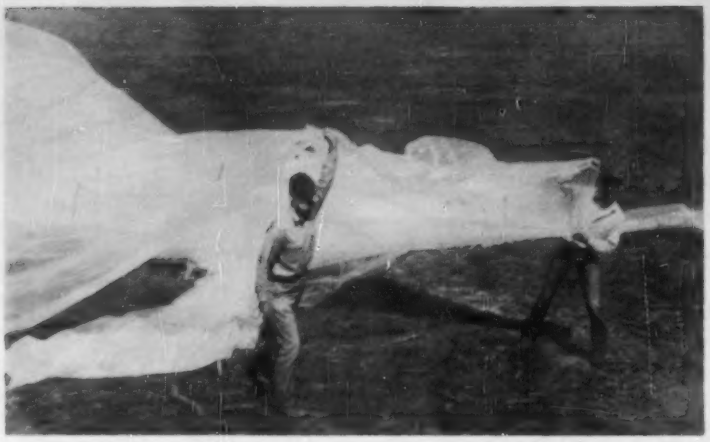
If you would like more detailed information on sound cancellation, ask your G-E Sales Engineer for a copy of a new technical bulletin, GET-2475. General Electric Co., Schenectady 5, New York. 421-30



Power Transformer NEWS

Progress Is Our Most Important Product

GENERAL ELECTRIC



Weather Balloon Interrupts Service

A giant weather balloon, soaring over Texas, recently struck a Texas Electric Service Co transmission line causing a two-minute power interruption at Olney and Archer City. The balloon, which measures 92 ft in diameter when fully inflated, is shown above being gathered in by C. E. Toner and J. N. Grace, transmission workmen.

Released by the Holloman Air Force Base in New Mexico for weather studies, the balloon had deflated to a diameter of 30 ft when it hit the Texas line. Circuits touched, the balloon caught fire, and oil circuit breakers were tripped at Holliday and Graham.

NW State Plans Hydro Control

First step toward formation of a Washington State "super-agency" to control and preserve state sovereignty over its water resources has been taken by Gov. Arthur B. Langlie with appointment of an organizing committee of state department directors.

Formation of the agency has been instigated largely for two reasons: (1) Divergent demands by industry, agriculture, and fishery interests require a single organization to co-ordinate water resources providing for multiple use without depletion or pollution; and (2) court rulings have pointed up the need for strengthening of control over all waters in the state to preserve state sovereignty.

One of the key factors leading to initiation of the agency was a legal decision last year that a hydro electric dam could be built on the Cowlitz River despite state legislation banning such construction. Courts have declared that under existing legislation, jurisdiction over navigable streams, such as the Cowlitz, rests with the federal government, not with the state government.

Most water sources are controlled already by one state department or another, but no central co-ordinating agency exists.

Members of the organizing committee for the new agency include William Galbraith, state director of conservation and development; Robert Schoettler, fisheries director; John Biggs, game director; Dr John Kahl, state health director; Sverre Omdahl, agriculture director; and E. F. Eldridge, director of the State Pollution Control Commission.

FPC Go-Ahead Sought

License to build a 60,000-kw power plant on the Missouri River near Great Falls has been sought by Montana Power Co from the Federal Power Commission. The new plant will be constructed 2¼ mi downstream from the utility's Rainbow Plant and will be named after Harry H. Cochrane, chief consulting engineer for the company, who has served the Montana electric utility industry for almost 50 years.

Sacramento MUD Buys 300,000 kw from PG&E

Sacramento Municipal Utility District, anticipating inadequacy of present power sources, has entered into a contract with the Pacific Gas & Electric Co for up to 300,000 kw of power with delivery beginning in three or four years.

James E. McCaffrey, SMUD general manager and chief engineer, said at the present rate at which the district's electrical load is growing, the 290,000 kw under contract from the federal government's Central Valley Project will be fully utilized in the next three or four years.

Royal Miller, president of the district's board of directors said the contract means SMUD will be able to meet its heavy growth in power requirements between the time the 290,000 kw of CVP power are in use and the date the first units of the Upper American River Project come on the line.

SMUD has announced plans to construct a $80-million power system on the American River to add 200,000 kw for its needs.

McCaffrey said the PGE power will provide the energy needed to firm up the contemplated hydroelectric facilities. The agreement puts to an end for the time being talk of SMUD building its own steam generation facilities to supplement its present supply.

Icebox Safety Laws Passed in Tennessee

Safety campaigns waged against the possibility of children being trapped in iceboxes or refrigerators have won the passage of two bills in the Tennessee General Assembly.

Both measures, affecting either structure or storage and disposal, deal with "iceboxes . . . refrigerators or other airtight or semi-tight containers . . . which are offered for retail . . . and which have a capacity of 1½ cu ft or more, . . . an opening of 50 sq in. or more, and a door or lid . . ."

House Bill No 284 requires that such containers "be equipped with a safety device which will open the door or provide a means of escape from the interior."

Senate Bill No 41 makes it unlawful to store or abandon the described containers in a place accessible to children.

Violation of either law is punishable by a $200 fine or 30 days in jail or both.

a slow speed meter will live longer too!

In these fast-moving times, it's almost standard practice for doctors to warn busy executives to slacken their pace. Perhaps your doctor has advised you to slow down. If he did you probably took his advice because, well—we all want to live longer.

* * *

Slow-speed watthour meters will live longer too—because slow-speed means less wear on moving parts. This is why the Sangamo J2 Watthour Meter with its 6. constant will last longer than an ordinary meter with a 3.6 constant. The J2 is *the* slow-speed meter. There's less wear on all moving parts.

How much slower is the J2 than other meters? A full 40% slower. The J2 makes 111.1 *fewer* revolutions to measure 1 kilowatt hour.

THE FIRST WATTHOUR METER WITH

STRAIGHT LINE ACCURACY UP TO 100 AMPERES

SANGAMO
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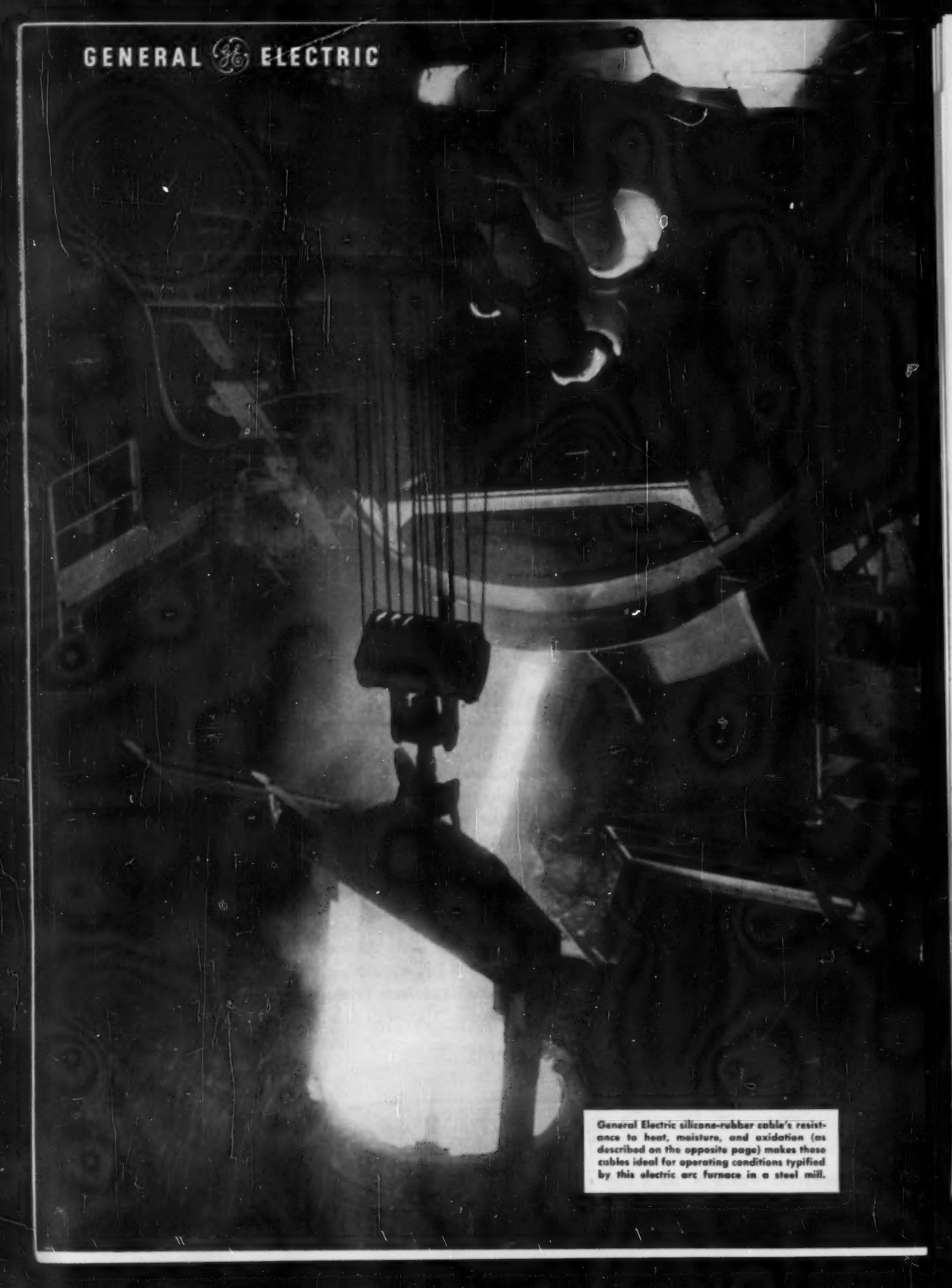

General Electric silicone-rubber cable's resistance to heat, moisture, and oxidation (as described on the opposite page) makes these cables ideal for operating conditions typified by this electric arc furnace in a steel mill.

IMPORTANT FACTS ABOUT NEW G-E SILICONE-RUBBER CABLES

New insulation permits high temperature operation for power and control circuits, equipment and generator leads

G-E silicone-rubber insulated cables, with higher ratings than ordinary rubber types, are now available for general plant wiring including power and control circuits, and equipment leads. These cables withstand higher operating and ambient temperatures—permit copper temperatures as high as 125 C for continuous operation. They maintain their electrical and physical properties, even through prolonged water immersion tests. Because silicone-rubber is moisture-resistant, no lead sheath is required.

These advantages, plus excellent ozone resistance, are the reasons why silicone-rubber cables will maintain circuit integrity where other cables often fail.

The high temperature rating will often permit you to run greater loads through existing conduit or duct installations — and installation is a simple matter. G-E silicone-rubber cable is as flexible as rubber-insulated cable and can be handled just as easily. No special tools, fittings, or terminations are needed. The tough asbestos braid permits easy pulling through conduit. The cable can also be supplied with flexible armor for open installation.

Write for the new free booklet for complete details. Section W156-727, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

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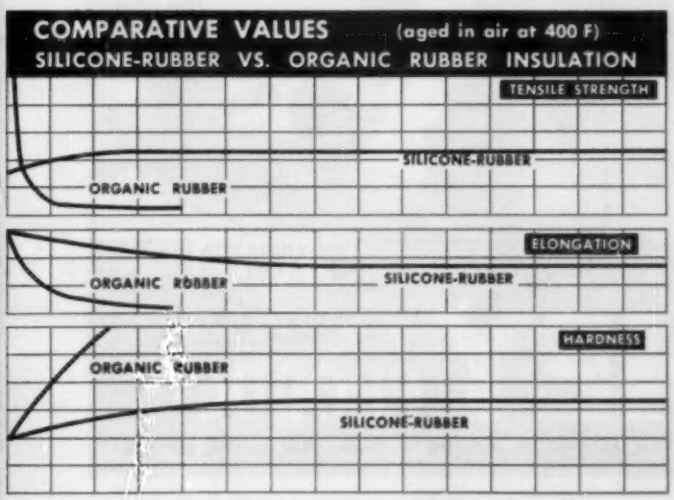

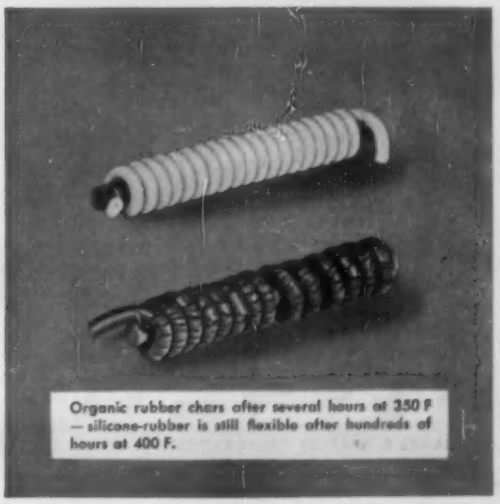

DEPENDABLE...

despite weather or structural warpage!

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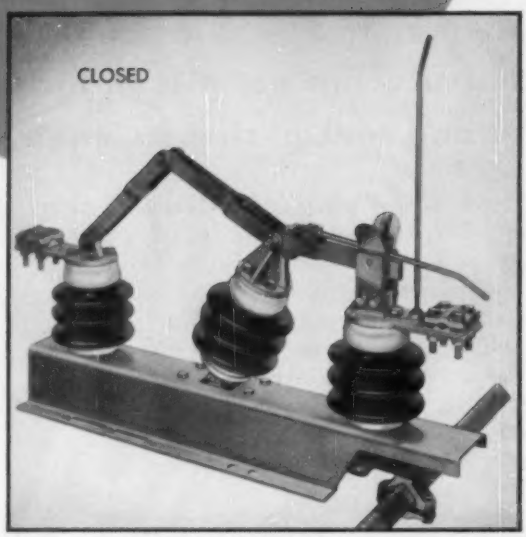
Tilting Insulator Group-Operated Switches

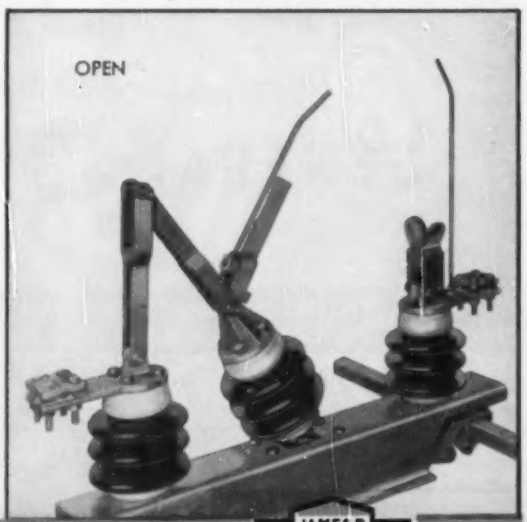
Here's a truly trouble-free disconnect! Even under extreme icing conditions, the "pry-out" blade breaks free easily. The high leverage of the Kearney "toggle" linkage lifts it from the jaws smoothly and easily . . . closes it without slam or damage to the insulators.

And it will work perfectly even if the switch poles are out of alignment. The interphase shaft clamp is designed to compensate for structural warpage. For easy installation, the interphase shaft can be lifted into the clamps after the switch is in position.

- *Oilite bearings support the tilting insulator*
- *Extra long jaws . . . blade travel adjustment need not be critical*
- *Silver-plated blade-to-jaw contacts*
- *Sturdy, deep-drawn base with wide bearing flange to prevent cutting into crossarms*



TYPE KT-3 Ratings 400 - 600 AMP. 7.5 to 34.5 KV.



275

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Wartime Power Needs . . .

. . . to be surveyed as agencies show inability to agree on what nation's requirements will be in event of atomic warfare

Inability of some government agencies to agree on the nation's possible power requirements in the event of all-out war is sparking a thorough study and review of the situation. To give greater weight to such a study, the agencies are expected to call for private industry participation.

The Edison Electric Institute, the industry's trade association, maintains a power survey committee which has its finger on the pulse of the nation's power situation. It published a survey every six months. The last survey was reported in EW, May 16, p 90.

The disagreement among Washington agencies came out in a hearing before the Joint Committee on Defense Production, the Senate-House unit watching over our mobilization planning.

Best guess of the two opposing schools of thought among government power experts is that there is enough capacity in place, or firmly scheduled, to carry the nation through the first 12 months of a major conflict. Beyond that, even the most optimistic officials admit we will need much more.

Past Estimates Cited

Arthur B. Vieregg of the Interior Department's technical review staff made the 12-month prediction. He based this on the idea that a wartime rise in power demand would progress slowly, due to the inevitable lag in retooling automobile and other civilian manufacturing plants and to restrictions which could be placed on the civilian population's home consumption.

Vieregg said, in fact, national power use could even decrease during the tooling up in the first year of a war.

This led J. Warren McLaughlin, power consultant to the secretary of defense and a former member of the Office of Defense Mobilization's planning force, to argue that no previous estimate of wartime power needs has ever been acurate—one Korean war period survey was 33⅓% off base, he said.

McLaughlin is submitting his own estimate of wartime needs to the Joint Committee. It's a one-man job, he admits, but the Joint Committee asked for it to enable them to have a comparison against which to match Vieregg's prediction.

One thing that will come about as a result of the hearing is a complete analysis of the nation's—and its regions'—wartime needs for power, and our ability to meet these.

Such a study has been in the works for at least a year. It was asked by the National Security Council, top defense planning agency. The Office of Defense Mobilization called on Interior to undertake the job, and it was then the hassle began.

Interior's never done anything like this. It did make a study, but it based its conclusions on plans calling for only partial mobilization, not all-out atom warfare.

On the basis of this study, the Agency in 1953 advised against reopening the electric power expansion goal under which rapid tax amortization privilages are granted the agency. Then Under Secretary of Interior Ralph Tudor signed that recommendation.

When ODM received this, it disregarded Interior's advice because it figured the study was not based on assumptions that full-scale war had already broken out. ODM immediately reopened the power goal, raising it from 116 million kw of installed capacity by the end of 1955 to 150 million kw installed by 1958. It also demanded that Interior institute a new study.

Interior replied that it would require more information on possible bomb damage and military and atomic energy requirements in event of an overnight wartime buildup.

Until this week, that's where the matter stood.

But the argument has been broken up, through the Joint Committee's intervention. ODM, the Defense Department, and Interior are once again in harmony, and they're all breaking their backs to get the study underway.

Cordiner Visits PP&L's Yale Dam

An inspection tour of Pacific Power & Light Co's Yale Dam in southwestern Washington was made recently by Ralph J. Cordiner, president of General Electric Co, while he was visiting the Pacific Northwest. He is shown above (second from right) discussing the 133,000-kw project with PP&L officials. They are (l to r) George T. Bragg, vice president and general manager; D. R. McClung, executive vice president; and Paul B. McKee, president.

handled with care!

Use of a metal cradle protects those O-B Suspension Insulators while they're hoisted to the cross-arm. Such care shields every insulator from rough treatment; makes sure each string goes into service in factory condition. Careful handling by the builder is only to be expected, after choosing best-quality materials for this 330-kv line. Successful transmission at extra-high voltage depends on first-class materials in first-class condition.

On this job where materials *must* be right, it is significant that O-B Suspension Insulators and hardware are used, just as they have been chosen for use on every other extra-high voltage transmission line operating or under construction in the Americas! Ohio Brass Company has earned this confidence for its products in a half-century of design and production of insulation of the highest character.

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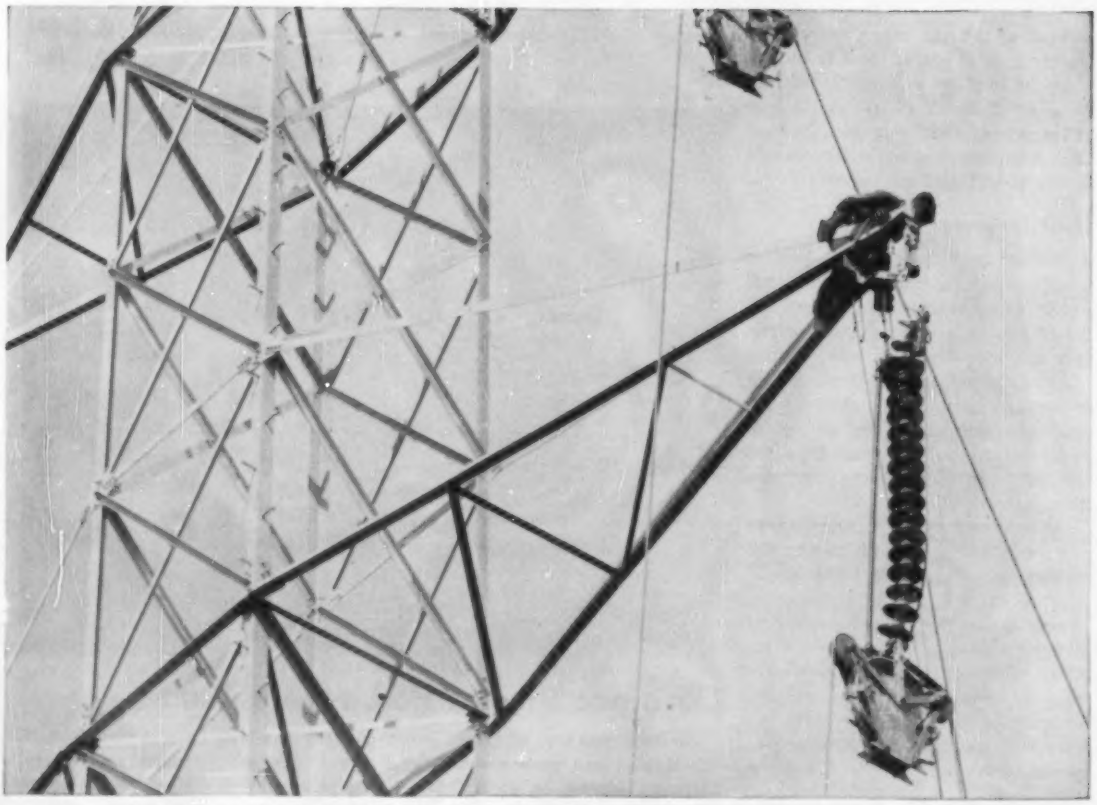


Simple, sensible protection delivers O-B Suspension Insulators to the crossarm in factory condition.

E&O PROGRAM HIGHLIGHTS are discussed by speaker E. C. Starr, BPA chief engineer, with F. H. Lehman, Clark County PUD, and O. E. Hittle, Cowlitz County PUD

SYSTEM ENGINEERING—Planning

NW Waits out Atomic Power

BPA engineer tells Northwest Public Power Section that hydro potential makes it possible for area to await developments

The undeveloped potential of its hydroelectric sites precludes the Pacific Northwest from becoming a proving ground for nuclear power plants. This region need not be in a hurry to choose between nuclear and fossil fuels for its steam plants.

This was the belief expressed by E. C. Starr, chief engineer, Bonneville Power Administration, at the meeting of the Engineering and Operations Section of the Northwest Public Power Association. The group met May 19-20 at Longview, Wash.

Prospects in the Northwest are that there will be another decade of 2-3-mill power, Starr continued. He pointed out that as full development of water resources takes place over the next 20 years, newest hydro generation will cost 5-7 mills including the cost of transmission.

Watch and Wait Is Starr's Advice . . . During this time many types of reactors will have been built, and improvements will have continued in the development of fossil-fuel plants. Starr considers the 5-7-mill cost as the possible crossover point between costs of economic hydro and steam power. By watching developments in steam generation during the next 15 years, power agencies will be in a position to choose between nuclear and fossil fuels for major generating units. He felt fissionable uranium alloyed with bismuth looks promising and may influence reactor design.

Ken J. Lien, Cowlitz County (Wash.) PUD, said that on his distribution system a loop feed had proved the most reliable for service to areas with load densities of 10,000 kva per sq mile. Substations with supervisory control have contributed to this reliability.

Experience gained with temporary dispatching boards helped in the final design of permanent boards, W. D. Dorway, Snohomish County (Wash.) PUD told the group.

Microwave Good During Storms . . . Communications can be maintained during storm conditions with the use of a small microwave radio system employing small, high-gain antennas, said Ron Boyles, Tacoma City Light. Should such a system require only one or two voice channels, microwave equipment costing $8,000-$10,000 may be suitable.

Modern trends in metering practices were discussed by J. C. Taugher, General Electric Co, who compared use of 480-v meters vs 120-v meters with potential transformers. About 70% of the industry uses the 480-v units. Use of potential transformers, however, is almost universal where recording demand meters are involved.

W. A. Elmore, Westinghouse Electric Corp, pointed out that diversity of characteristics, precision, simplicity of maintenance, and lower cost are reasons behind the overwhelming choice of the induction overcurrent relay for subtransmission and distribution relay applications.

W. H. Fell, Pacific County PUD, warned utilities must guard against needless paper work.

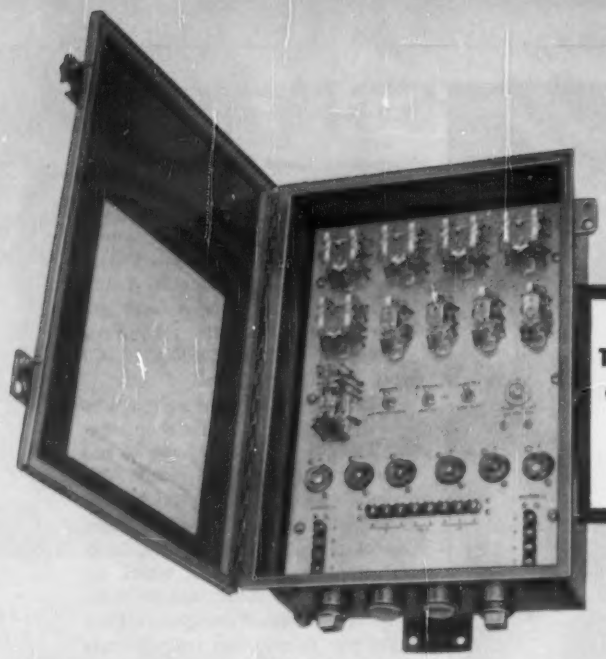
G. K. Christianson, Cowlitz County PUD, said radiant electric heating of floors in their vehicle shop increased comfort, reduced colds, and cut absenteeism.

Wearing of hard hats by linemen will be made mandatory, reported Seattle City Light. And it was added that new state safety rules in Oregon will make their use mandatory.

During the meeting, Alan L. Hunnicutt, chief engineer, Benton-Lincoln Electric Cooperative, Corvallis, Ore., received the Milton Hunt McGuire award for engineering achievement. He was elected section chairman for the coming year.

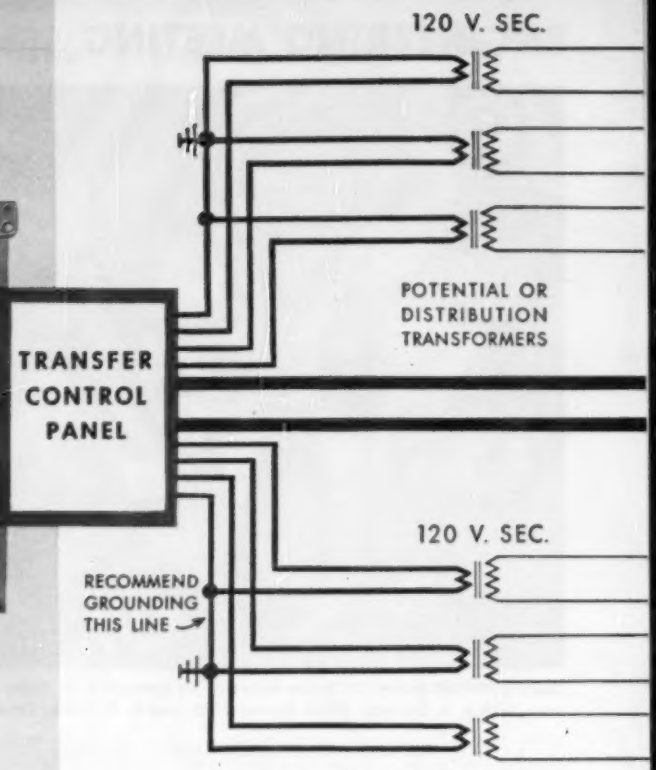
Merced ID Seeks Permit

Merced (Calif.) Irrigation District has filed application with Federal Power Commission for a 36-month preliminary permit for the proposed Horseshoe Bend reservoir and power project in Mariposa County. The proposal includes a powerhouse with 64,000-kw installed capacity and a 460-ft high Horseshoe Bend Dam across the Merced River.



TYPE S TRANSFER CONTROL

L-M's Type S automatic load transfer control is completely enclosed in weatherproof steel cabinet. It is designed to operate with L-M's single-phase Type NR switch, heavy-duty Type R three-phase recloser, or L-M's new three-phase heavy-duty Type VR switch.



NOTE: Control may also be furnished for single-phase sensing, is recommended if three-phase protection is provided in each feeder.

NOTE: For simplicity, protective equipment (fuses, lightning arresters, etc.) are not shown.

Automatic Load Transfer Control For 4-Wire Wye System—Three-Phase Sensing

The diagram above shows a typical load transfer scheme. Below is the operating sequence using L-M's new Type VR switch and Type S transfer control panel. This provides an economical and dependable method of assuring service continuity.

Operation of the Three-Phase Sensitive Control

1. Assume load is connected to Source I and potential on either phase A, B, or C is lost. If either X, Y or Z is not energized, no switching occurs. If X, Y & Z become or are all energized, VR on I opens and VR on II closes, after time delay, thus transferring load to other feeder.

2. Assume control is set for "Source I preferred," load is connected to II, and X, Y & Z are energized. If energy returns to A, B & C, VR on II opens and VR on I closes, after time delay.

Assume control is set for "no preference," load is connected to II, and X, Y & Z are energized. If A, B & C are energized, nothing happens. If X, Y or Z then loses potential, after time delay VR on II opens and VR on I closes.

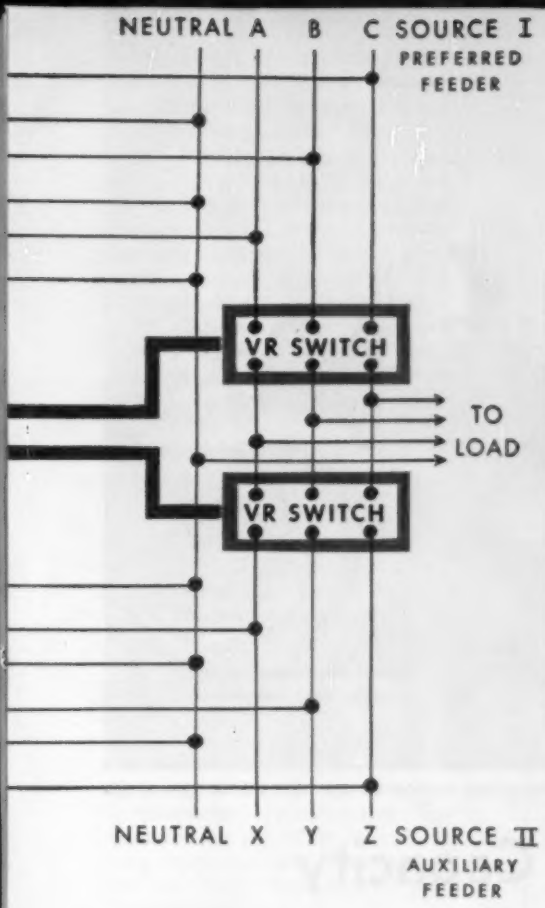
3. Control is sensitive to three-phase energy. It seeks to disconnect single- or two-phase service but will remain on the same source if the other source is not three-phase.

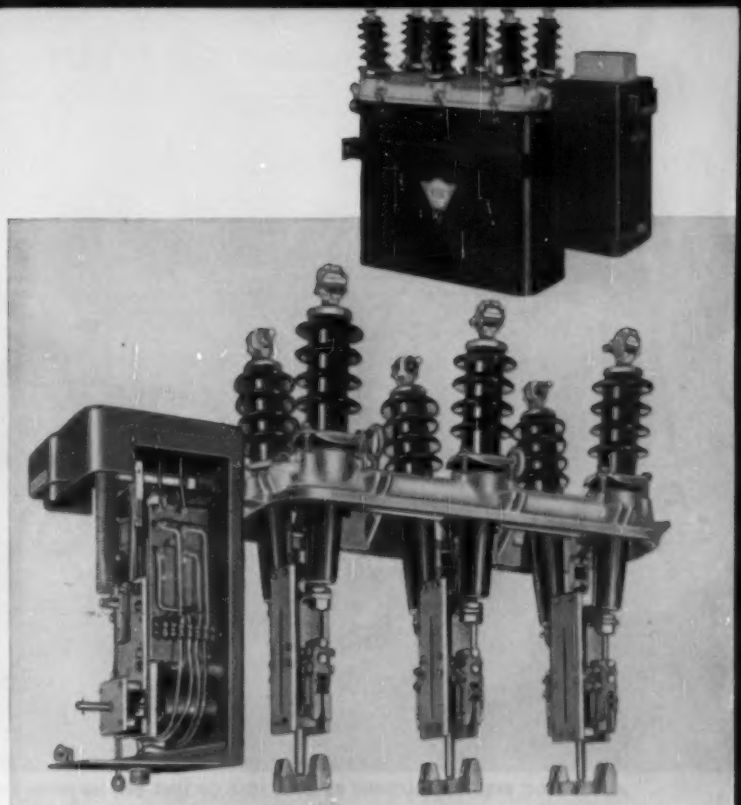
4. Electrical interlock insures that VR I is open before the other switch begins to close. This applies to both automatic and manual motoring operations.

5. Manual switches provided inside cabinet to transfer load to either source. Another switch selects "Source I preferred" or "no preference."

6. Time delay adjustable up to approximately one minute; longer delay (up to 5 min.) available on special order. Same delay, either direction of transfer. Delay should be set to prevent false operation on transient conditions.

LINE MATERIAL





VR SWITCH L-M's new heavy-duty Type VR switch is rated at 14.4 kv RMS, with a 110 kv BIL, a 20,000 ampere momentary rating and a 400 amp thermal rating. Simultaneous clearing of all phases in 3 cycles. Solenoid operates on 120 volt secondary, requires 1.5 amps to trip.

Automatic Switching...

L-M's New Load Transfer Equipment Assures Service Continuity To Important Loads

By **FRANK McSTAY**
Product Manager
Kyle Products
Line Material Company

Distribution systems are being called upon to be even more reliable in supplying power to important loads. Hospitals, radio and television stations, government and many industrial loads must have better service continuity.

L-M's new Type S automatic load transfer control and Type VR heavy-duty oil switch provide an excellent means for automatically switching important loads during feeder outages.

Automatic Load Transfer Control

The Type S control is a pre-assembled, pre-wired relay device which is completely enclosed in a weatherproof steel cabinet. It is quick and easy to install.

Adjustable time-delay relays are used in L-M's Type S controls to prevent false operation on transient conditions. An interlock mechanism in the control circuit permits load transfer to the auxiliary feeder only after the switch has disconnected the faulted feeder. The interlock is also arranged so that the Type S will transfer the load only when the auxiliary or standby feeder is energized.

The Type S control is extremely versatile. It will operate with L-M's single-phase 200 ampere Type NR switch, with the heavy-duty Type R three-phase recloser, or with L-M's new three-phase, heavy-duty Type VR switch. The type S can also be applied to automatic reclosing circuit breakers which have been slightly modified.

Heavy-Duty, Three-Phase Oil Switch

L-M's new remote control Type VR oil switch is a 14.4 kv 400 ampere heavy-duty switch, designed for capacitor switching, distribution feeder sectionalizing, and automatic load transfer applications. The Type VR has a 110 kv BIL with a 20,000 ampere momentary rating. The unit trips and clears all three phases simultaneously in three cycles.

An auxiliary switch is available with the VR or can be added in the field. It may be a one, two, three, or four stage unit, used for remote-position indicating or low-voltage-control switching of apparatus used in conjunction with the VR switch.

Get bulletins and complete information on new load transfer schemes and equipment from your L-M Field Engineer, or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

225

Kyle® Switchgear

AUTOMATIC REELING MACHINE PULLS A MILE OF LINE PER HR WITH OPERATING RANGE OF 3.3 TO 9.9 RPM REEL SPEED

Reconductors to Build Capacity

CEI finds method has mechanical and cost factors favoring its use on 34.5 and 132-kv existing lines after installation of new 420-Mw Eastlake Plant

FRANK J. BROWN, Senior Engineer, Electrical Engineering Department, Cleveland Electric Illuminating Co, Cleveland, Ohio

The Cleveland Electric Illuminating Co recently reconductored its 34.5 and 132-kv lines to increase their capacity, following installation of 420-Mw generating capacity at the new Eastlake Plant. A study of mechanical problems and comparative costs favored reconductoring as the method for building capacity of the existing lines when line-supporting structures are to be preserved with a minimum of alterations.

CEI's new generating capacity had to be tied into four existing 132-kv circuits. These were composed of 4/0 copper conductors which were inadequate for such a load. Load growth on sections of the 34.5-kv radial subtransmission system was also bringing the 1/0 copper close to its thermal carrying capacity, particularly during emergencies when feeders were tied together.

In deciding to reconductor, the utility discarded these alternative methods:

1. Raising insulation levels on the installed conductors for a higher line voltage.

2. Bundling conductors by adding others in parallel with the existing one.

Alternatives . . . Raising line voltage one or possibly two insulation levels would involve a major and expensive system change extending to substation transformers, switchgear, and the bus insulation level. Moreover, a substantial voltage boost would probably necessitate considerable rebuilding of line structures to obtain the required conductor clearances. But benefits other than increased line capacity attend raising system voltage, such as improved voltage regulation and system stability. These advantages alone could influence choice of this method under other circumstances.

Bundling also has advantages over reconductoring, particularly in the electrical features of the line. Bundle conductors have a lower series reactance, a greater shunt capacitance, and higher current-carrying capacity than single conductors of the same total cross section. These benefits, however, may be offset by some mechanical problems associated with bundled conductors, such as:

1. Action created by magnetic forces which tend to pull component wires of a phase together.

2. Mechanical damage caused by frequent impacts between wires.

3. Icing, causing unequal loading in the component wires.

4. Corrosive action between wires of dissimilar metal.

5. Difficult hardware connections, especially with suspension and strain type insulators.

Yet adding a second conductor per phase may be economically attractive, particularly when the salvage value of the existing conductor is low.

The doubtful solution of the mechanical problems of bundling led CEI to feel that reconductoring was the better choice. This was particularly true with regard to medium-long span, steel-tower lines. CEI's choice had additional support in the fact that a greater increase in current-carrying capacity can be obtained for a given allowable transverse-wind load when a single conductor is used. This was an important consideration in view of the load-growth possibilities of CEI lines.

Labor costs of installing bundled conductors could not be evaluated too precisely, especially when a second conductor is to be strung on suspension insulators at average spans of 700 ft. In addition to being considerably lower, the labor costs of reconductoring could be controlled more closely. This was seen as practicable through the anticipated use of an automatic reeling machine which would reel up old conductors and pull in new ones in a single operation.

Accordingly, reconductoring was preferred by the utility because of both mechanical and economic features that made it more attractive than bundled conductors.

Conductor Choice . . . Relatively low annual cost was CEI's criterion for selecting the conductor, and its economic study of conductor sizes considered the following factors:

1. Initial investment, taking into account labor, material, cartage, stock handling, and overhead. Annual carrying charges on the initial investment were taken as 14% of this total.

2. Energy charge based on fuel costs, including on an annual basis the value of the kwhr losses in the conductor at 3.5 mills per kwhr.

3. Capitalization charges, taking into account the value of system capacity needed to generate the kw and kvar losses in the line at peak load. The former was taken at $150 per kw and the latter at $10 per kvar with 14% carrying charges on the investment to supply these.

In calculating fuel costs, a multiplying factor accounts for the fact that actual annual energy losses are less than they would be at continuously applied peak load. This "loss factor" is a function of the load factor of

FIG. 1—Annual Costs for Three Conductors

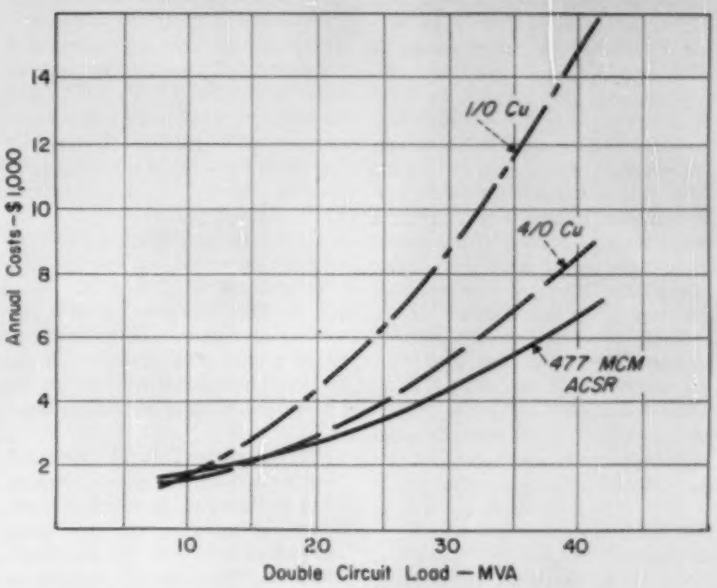


FIG. 2—Annual Costs vs Conductor Size for Four Peak Loads

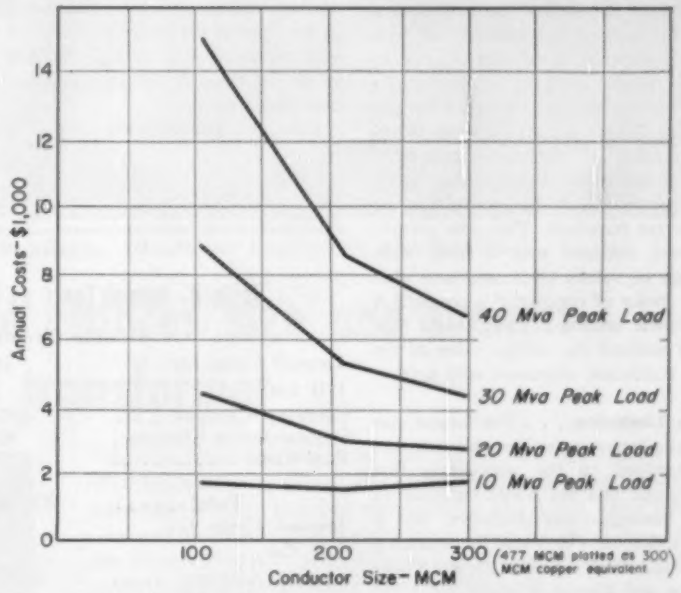


Table I—Conductor Characteristics and Annual Costs—34.5 kv

Conductor	Initial Investment per mile	Annual Carrying Charges @ 14%	Resistance Ohms per mile	Reactance Ohms per mile
1/0 Cu	$ 6,100	$ 854	0.555	0.709
4/0 Cu*	8,000	1,120	0.278	0.654
477 MCM ACSR	10,100	1,414	0.196	0.593

* The investment costs for 4/0 copper were based on the use of a reclaimed wire from another source on the system.

the line. For a 70% load factor, a typical line has about a 60% loss factor, which is equivalent to saying annual effective current squared is 60% of peak current squared.

Calculation details appear in Table I, illustrating a typical set of annual costs for 34.5-kv circuits. Three conductors were studied, the 1/0 copper being then in common use on the subtransmission system, thus affording a comparison of existing and proposed conductors. As all lines were double circuit, cost estimates were based on a change of six conductors.

Table II shows annual costs vs double circuit Mva load at 35 kv, capitalization and fuel charges being again based on costs for a double-circuit line. The following formulas were used in calculating these factors:

1. Annual Capitalization Charges = 2×3 ($I^2R \times \$150/kw + I^2X \times \$10/kvar$) $\times$ 14%.

2. Annual Fuel Costs = $2 \times 3\ I^2R \times 60\% \times 8{,}760$ (hours in year) $\times$ \$.0035/kwh.

Fig 1, plotting total annual costs vs line load, shows that the largest conductor is most economical for peak loads over 16 Mva. Fig 2, plotting total annual costs vs conductor size for a given line load, reveals a definite saving for the larger conductor. When the choice of economic constants in the calculations seems questionable, the process may be repeated, using different constants. The same relative answer obtained over a fairly wide range of values gives assurance that the choice of conductor is correct. A complete economic study would take into account the salvage value of the old conductor, dispensed with here.

Size Limitation . . . The largest size of conductor under consideration was determined on the assumption that no major changes would be made in the line-supporting structures. But a limitation must be placed on conductor size to preserve proper ground clearances and stresses in structures.

Most of CEI's transmission was designed when it was required to assume higher transverse loads and lower allowable stresses. The fifth edition of Part 2 of The National Electrical Safety Code liberalizing these requirements, enabled the company to consider a larger-size conductor than would have been permitted formerly.

When this investigation was carried out, the company determined that strength and clearance requirements on steel-tower transmission could be met with a combination of about 30% increase in loaded tension and a 10% increase in sag over the existing 4/0 conductor. Mechanical calculations indicated that 795-MCM ACSR could be used, provided there was a small reduction in weight from the standard strandings listed in the manufacturers' catalogs. When CEI asked manufacturers to supply information on a conductor of this size with less steel content and less weight, one manufacturer suggested use of 795-MCM, 36/1, ACSR. This conductor not only met mechanical requirements but cost less initially than other strandings in the catalogs. It was therefore chosen for 132-kv transmission reconductoring.

Field Techniques . . . The overhead lines department suggested purchase of an automatic reeling machine which could reel up three old conductors and pull in three new ones in a single operation. This machine consists of a 32-ft trailer on which are mounted three wire take-up reels. The take-up reels are driven by a motor mounted on the front of the trailer with a drive shaft extending back along one side for gearing through individual clutches to the three reels.

This unit was designed to pull 1 circuit-mile per hr with an operating range of 3.3 to 9.9 rpm reel speed. At any speed the torque is enough to exert a pull of 2,000 lb continuously and 3,800 lb intermittently on each wire. A hydraulic elevator under each reel removes the spool bar when the reel is full. The machine can handle reels up to 45 in. wide and 72 in. dia.

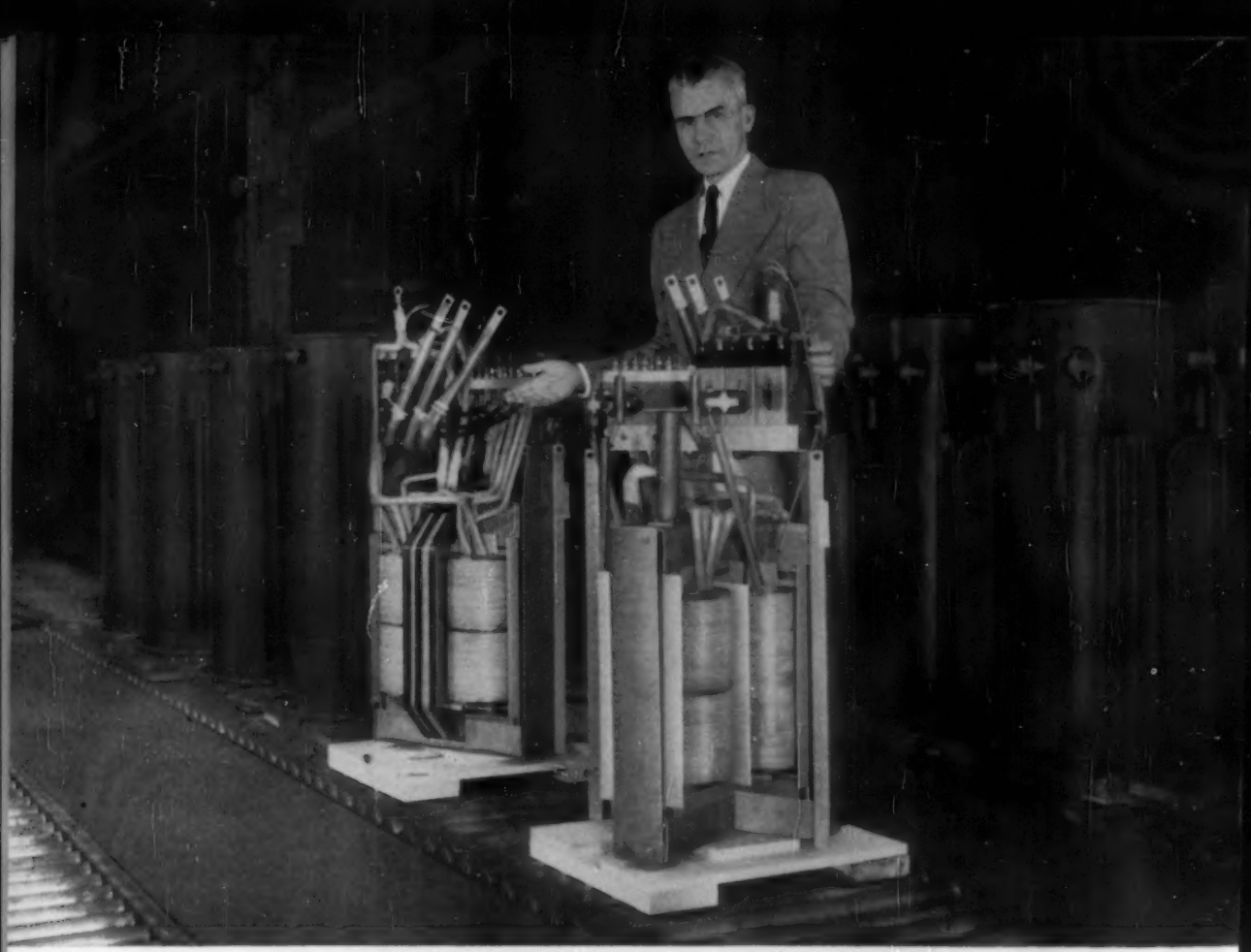
In reconductoring a section of tower line, the old wire is placed in blocks. The three wires at the far end are then attached to the new wire with cable grips which pass through the blocks. At the near end, the old wire is cut slightly ahead of the machine and attached to the proper reels. Although it takes about an hour to pull a mile of circuit, only 2 miles are changed in a day to allow time for splicing, clipping in, and sagging.

With minor variations, this progress is obtainable on wood-pole subtransmission circuits.

Fortunately, most reconductoring on the CEI transmission system was done on sections of right-of-way where four circuits parallel each other. This permitted de-energizing two circuits for safety reasons at selected load periods. But temporary line by-passes had to be built on some sections of subtransmission line to string the new conductors past customers' tap structures.

Table II—Annual Costs vs Double-Circuit Load—34.5 Kv

	Double Circuit Load in MVA			
Annual Costs for 1/0 Cu	**10**	**20**	**30**	**40**
Carrying Charges.....	$854	$854	$854	$854
Capitalization Charges .	487	1,948	4,383	7,792
Fuel Costs	394	1,576	3,546	6,304
Total.....	**$1,735**	**$4,378**	**$8,783**	**$14,950**
Annual Costs for 4/0 Cu				
Carrying Charges	$1,120	$1,120	$1,120	$1,120
Capitalization Charges .	261	1,044	2,349	4,176
Fuel Costs	198	792	1,782	3,168
Total.....	**$1,579**	**$2,956**	**$5,251**	**$8,464**
Annual Cost for 477 MCM ACSR				
Carrying Charges	$1,414	$1,414	$1,414	$1,414
Capitalization Charges .	191	764	1,719	3,056
Fuel Costs	139	556	1,251	2,224
Total.....	**$1,744**	**$2,734**	**$4,384**	**$6,694**



M. G. Leonard, Section Manager, Distribution Transformer Engineering describes this

FACT: TC core reduces size and weight of new 3-phase transformer

The new Westinghouse pole-type three-phase transformers offer the completely redesigned TC Hipersil® steel core, which materially reduces size and weight. The 112½-kva units, for example, are reduced in weight from 2460 to 1800 lbs., in size from 20″ x 32″ rectangular to 24″ diameter round. The result is savings in handling and installing.

Here's a double-edged way your transformer dollar can cut distribution apparatus investment in the fast-growing, 3-phase load trend.

• • •

Get more facts from The Man With The Facts . . . your Westinghouse Sales Engineer, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-70742

YOU CAN BE SURE...IF IT'S Westinghouse

Helping the industry meet its growing loads

Machines that think help push back frontiers of engineering

In the same way that machines are relieving 20th century man of many of the physical burdens he has borne for centuries, so, too, are they taking over many of the tedious, time-consuming mental tasks.

Westinghouse is proud of its leadership in analytical facilities. Typical of this leadership is the world's largest and most modern a-c network calculator, installed at the Westinghouse East Pittsburgh works. The new unit is the 36th calculator in the United States of which Westinghouse has built the majority. Any customer may use this board to help solve his problems.

One of the newest uses for the a-c board is in the economic dispatch of electric power. While utilities generally want to use their most efficient stations when load is under 100% of capacity, power transportation costs must be considered. Due to system losses, it is often cheaper to use a less efficient station closer to the load. In view of this, many power companies are making and using the results of economic dispatch studies. The a-c board is of great value in such cases in providing the correct loss formula. As the increasing complexity of power system interconnections makes new demands on utilities, the a-c board becomes even more valuable.

Other analytical facilities available at Westinghouse include many types of digital computers and analog computers. These modern research tools back up the design of all major Westinghouse products for the electrical industry. They reflect the Westinghouse attitude that every facility of modern science should be put to work to help meet America's growing electrical load—quickly and at lowest cost.

J-97188

YOU CAN BE SURE...IF IT'S Westinghouse

Calculator Availability

Westinghouse has been building *and selling* machines that "think" for over a quarter of a century. In addition, the analytical facilities of Westinghouse at East Pittsburgh are available on a rental basis, for use in solving your system's problems.

Network Calculator

Equipment available for your use includes the new a-c network calculator . . . the world's largest, with 36 generating stations and 580 circuits for use on very large system studies. For increased flexibility it has two control desks, so it can be split into one calculator of 24 stations and the other of 12. Thus it is possible to run studies on two systems concurrently.

The "Anacom"

Dr. E. L. Harder, Director of the Analytical Section, calls Westinghouse-built analog computers, "Anacoms". They make possible the solution in a few hours of problems that would take weeks or even years to solve by ordinary means.

Economic Dispatch Computers

One of the most recent developments in the field of electronic brains is the economic dispatch computer. Such computers, now being built and sold, can be used directly in the dispatching office to show the correct dispatch at all times. Since the computer can be kept continually up to date with system costs and availability of units, great numbers of precalculated dispatch curves with the means for modifying them for different conditions can be eliminated. Savings through proper use of the economic dispatch computer have been estimated at over $50,000 per year per thousand megawatts of generation on systems with extensive transmission.

Further details on Westinghouse analytical facilities can be supplied by your Westinghouse sales engineer—or write direct to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

Safe Harbor Water Power Names Utz President

F. W. UTZ

Safe Harbor Water Power Corp, owner and operator of a 230,000-kw hydro project on the Susquehanna River at Safe Harbor, Pa., has elected Frederick W. Utz president.

After graduating from Cornell University in 1922 as a mechanical engineer, Utz entered the employ of Pennsylvania Water & Power Co. In 1928 he went to Chile to become a vice president of the South American Public Service Co. In 1943 he returned to the United States and became associated with the Rubber Development Corp of the government in Washington, D. C.

Utz worked in the Pacific area as a civilian on a strategic bombing survey in 1945. In 1946 he became associated with the Stone & Webster Service Corp and will continue as a vice president of that company.

Safe Harbor WP, owned jointly by the Baltimore Gas & Electric Co and the Pennsylvania Power & Light Co, has just contracted to obtain advisory services from Stone & Webster Service Corp.

Ruoff Made Porcelain President

G. M. RUOFF

G. M. Ruoff has been elected president of Porcelain Products, Inc, succeeding Helen Grove Bicknell who died on May 29. He will continue his duties as a director and general manager of the High Voltage Division at Parkersburg, West Va.

A native of Baltimore and a graduate of Johns Hopkins University, Ruoff joined the Locke Insulator Corp which later became Locke, Inc, in 1927. He was transferred to Richmond as district manager in 1935.

In 1940 he became field sales manager and in 1944 was appointed general sales manager. In October, 1947 Ruoff was elected a commercial vice president of Locke, Inc.

He became associated with Porcelain Products as vice president, general manager, and director in 1951. He is the holder of a great many patents on insulators.

Engineers Honored at Western Universities

W. S. EDSALL

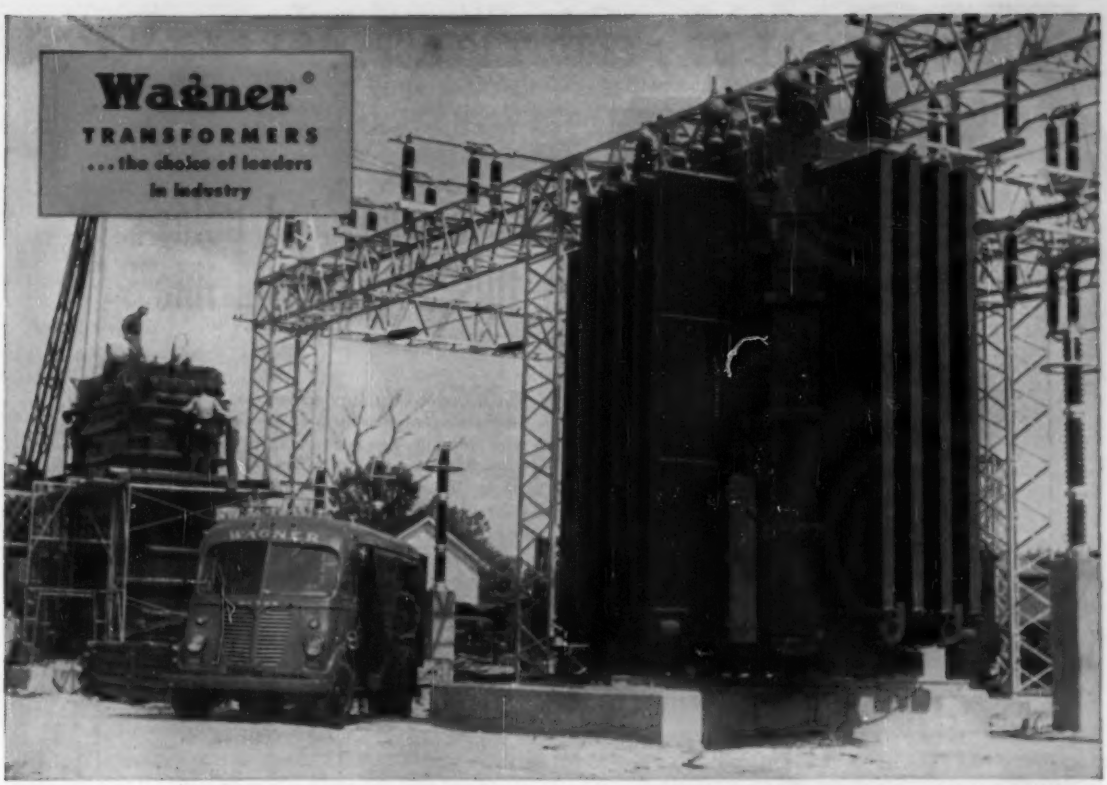
An engineer from an electric utility and one from a manufacturer of electrical equipment have recently been honored by western universities.

Lawrence M. Robertson, Sr, chief electrical engineer of Public Service Co of Colorado, was awarded an honorary doctorate degree in engineering from the University of Colorado. The honorary degree was conferred in recognition of outstanding achievement in electrical engineering.

William S. Edsall, president of Chase-Shawmutt Co, Newburyport, Mass., received an honorary doctorate degree in engineering from the University of Montana.

Edsall joined Chase-Shawmutt in 1945 as vice president and was elected president shortly thereafter. He has made many developments in electrical apparatus and equipment, particularly in switchgear and protective devices.

L. M. ROBERTSON, SR



...to help meet today's power needs in Memphis, Tennessee

In Memphis, Tennessee—the Memphis Light, Gas & Water Division recently completed the installation of two new Wagner 25,000/33,333 kva, 3 phase, 60 cycle power transformers at its new Adams Street sub-station.

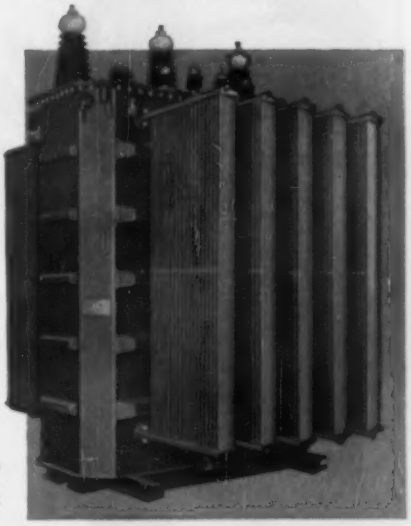
Two additional Wagner transformers of the same rating are located at Woodstock, Tennessee—making a total of four such units installed by this company to enable it to better serve Memphis and the surrounding area.

These four new transformers mean plenty of additional power for a growing Memphis and its citizens who are using more and more electricity every year.

To facilitate the installation of these Wagner Transformers, one of Wagner's specially equipped transformer service trucks was used at the work site. Wagner field service engineers helped supervise the installation.

That Wagner Transformers were chosen points up the fact that more and more electrical utilities are looking to Wagner for their transformer needs.

Why not consider Wagner Transformers for your next installation? 32 branch offices are maintained for quick, convenient engineering service and consultation. Write for Bulletin TU-180 and TU-181. They give full information on Wagner Power and Distribution Transformers.



Check ASA C57.12a Standards for your next power transformers. You'll save time and money.

Wagner Electric Corporation
EST. 1891

WAGNER ELECTRIC CORPORATION
6456 Plymouth Ave. • St. Louis 14, Mo., U. S. A.

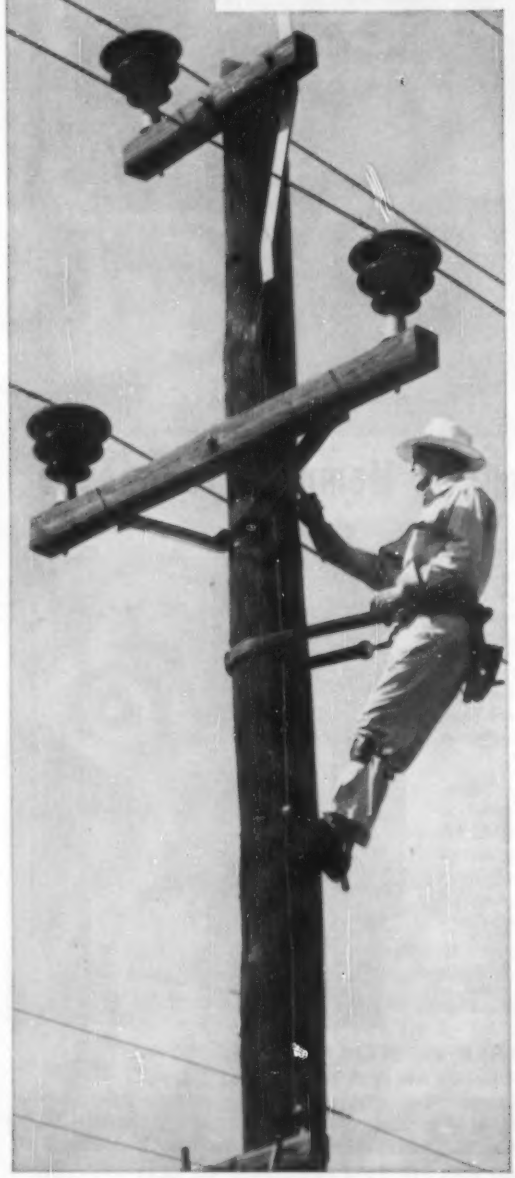
ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS • AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

T55-14

Here's Proof of Performance...

501 of 512 pressure-creosoted poles still standing in this 27-year-old line



Duke Power Company, Charlotte, N. C. —supplying power to 40% of the nation's textile spindles—has been using pressure-creosoted poles since 1913. Careful records kept by Transmission Engineer M. E. Kimbrell show an extremely low rate of pole failure.

A 17.4-mile transmission line between Elkin and North Wilkesboro, N. C. was erected in 1928 with 512 pressure-creosoted poles. Today, 501 of these poles are still in service in their original locations.

Pressure-creosoted poles which Duke Power Company is obtaining today not only meet the requirements for long life, but high standards of pole cleanliness as well.

Your pressure-treater can supply you with poles that meet these requirements, especially if he uses USS Creosote. It's a uniform preservative, made to give uniformly good results. For complete information, contact our nearest Coal Chemical sales office listed below or write directly to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

• • •

One of the 27-year-old pressure-creosoted poles in Duke Power Company's transmission line between Elkin and North Wilkesboro, N. C.

You can obtain clean pressure-creosoted poles upon specification without sacrificing pole service life.

USS CREOSOTE

SALES OFFICES IN

PITTSBURGH, NEW YORK, CHICAGO, CLEVELAND, SAN FRANCISCO AND FAIRFIELD, ALA.

USS

UNITED STATES STEEL

J. C. HOIBY

Two New VP's at Onan & Sons

D. W. Onan & Sons, Inc, has announced the appointment of James C. Hoiby as vice president in charge of engineering, and Hiram Hascall as vice president in charge of sales.

Hoiby, formerly chief engineer of the company, has been associated with the company since 1934. He will be in charge of the newly organized Engineering Division, including both production, and development and design.

Hascall has been general sales manager for the last 13 years. As vice president-sales, he will be responsible for Onan's direct sales force and distributor and dealer firms.

H. HASCALL

PERSONAL BRIEFS

James W. Carpenter, vice president of the Long Island Lighting Co, has received the Long Island Daily Press Service Award for 1954. This award is given by the newspaper annually to the citizen of Nassau and Suffolk Counties who is judged to have rendered the most outstanding service during the preceding year.

Connecticut Light & Power Co has created the Housatonic Hydroelectric Division to consolidate its hydro facilities on the Housatonic River. **Kenneth F. Beckley,** New Milford district engineer, has been named superintendent of the new division.

Theodore R. Oakes has been named assistant secretary-treasurer of Square D Co. He has resigned as treasurer of Houdaille-Hershey Corp of Detroit . . . Sylvania Electric Products, Inc, has appointed **Dr Bernard Kopelman** as chief engineer of its Atomic Energy Division. He has been manager of technical coordination of that division of Sylvania organization for the past three years.

Harry Davidson, chief clerk for the Great Falls Division of the Montana Power Co since 1921, retired on June 30. Succeeding him is Cecil Calvert, who began working with the company in 1918 as a construction timekeeper.

Howard Miller of the distribution department of the Wheeling Electric Co has been elected president of Local 264 of the Utility Workers Union of America, CIO.

W. F. Jarrett, superintendent of the powerhouse at British Columbia Electric Co's Bridge River plant, has assumed the new post of manager of operations for the company in Powell River area July 1 . . . Portland General Electric Co has appointed **Howard Arnett,** assistant general superintendent, to be assistant to Thomas W. Delzell, board chairman and chief executive of the Oregon utility.

Virginia Electric & Power Co has made these personnel changes: **W. Perry Johnson,** former sales supervisor at Roanoke Rapids, N. C., to director of rate application in Richmond; **Cecil A. Smith,** sales supervisor in Petersburg, to sales supervisor in Richmond. **James D. Egan,** Richmond sales engineer, replaces Smith.

Chamber of Commerce of the U. S. has named **Lewis M. Smith,** president of Alabama Power Co, as Chairman of the Committee on Commercial Uses of Atomic Energy for 1955-56.

West Penn Power Co has made these promotions: **A. J. Lois** to manager of operating and maintenance standards; **Ralph C. Dewey** to supervisor of operating standards and **Fred A. Ashbaugh** to supervisor of lines maintenance.

Commonwealth Edison Co has elected the following directors of the company: **Joseph L. Block,** president of Inland Steel Co and **Albert B. Dick III,** president and treasurer of the A. B. Dick Co.

Pennsylvania Transformer Co has made the following promotions: **John R. Smith** to the newly created position of product manager of distribution transformers; **Robert A. Dummer** to factory liaison engineer, succeeding Smith; **John Zubenko** to testing engineer, and **Stephen G. Long** in charge of all factory maintenance. John **Gomber** has been named foreman to assist Zubenko. Serving directly under Smith are: **Herbert W. Dornbush,** distribution design engineer, and **Wayne W. Ferguson,** distribution production supervisor.

OBITUARY

Charles A. Harrison, 62, vice president in charge of sales and a director of the Toledo Edison Co, died in Toledo, Ohio, on June 15. He joined Cities Service Co as a cadet engineer at the Denver Gas & Electric Co. He came to Toledo Edison as assistant general manager in 1935. He was made a vice president of sales and a director in 1943.

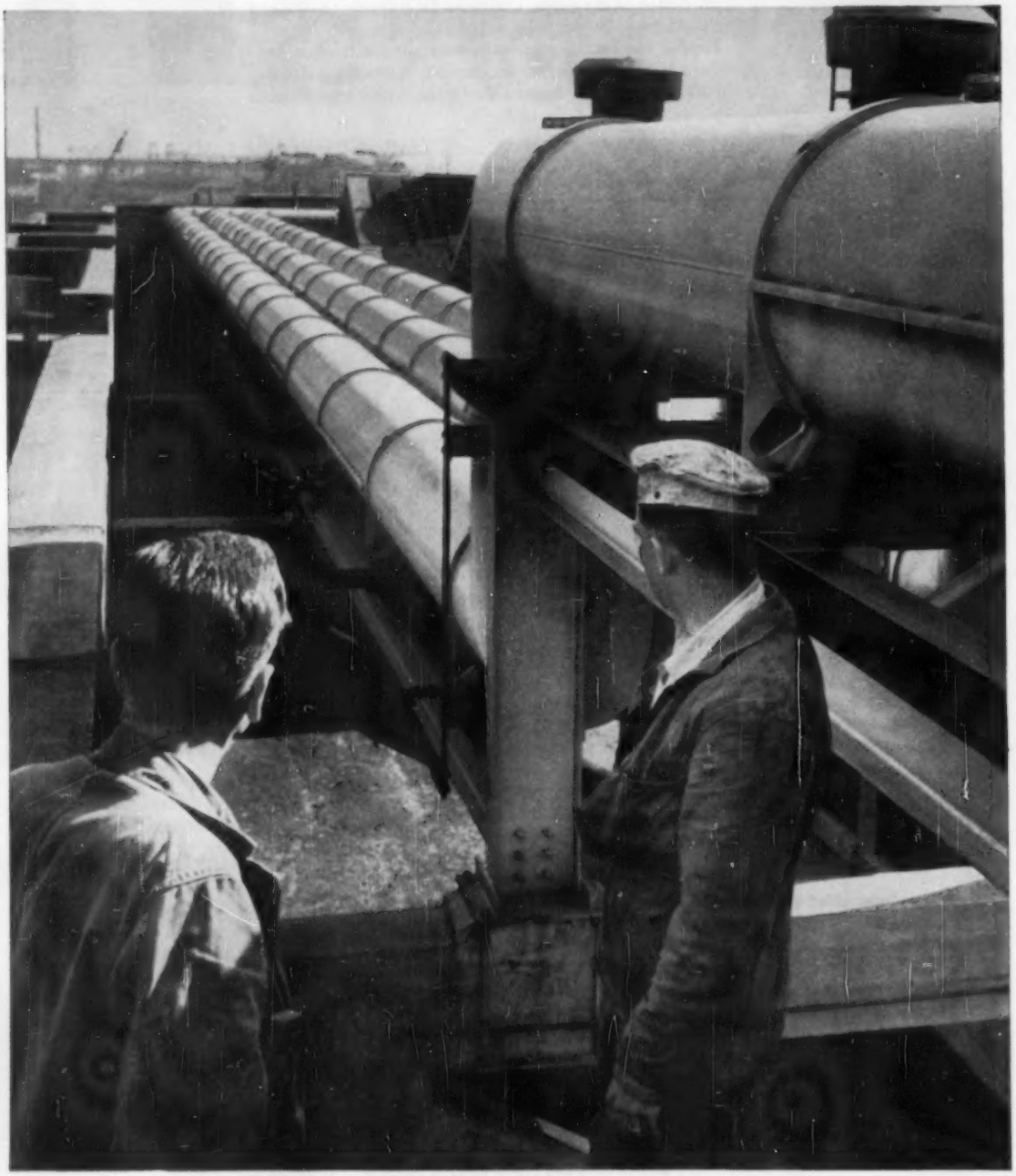
William D. Knowlton, 77, an electrical engineer for the Commonwealth Edison Co before his retirement in 1943, died on June 1.

Willard Dobson McClelland, 70, an electrical engineer employed with Utah Power & Light Co until his retirement about six years ago, died in Preston, Idaho.

Armando G. Finizio, 67, a retired electrical engineer from the American Gas & Electric Co., died of a heart attack in Roselle Park, N. J., on June 10.

Donald King, 45, chief engineer of the Oswegatchie Power & Light Co, Hailesboro, N. Y., was killed on June 11 when he came in contact with a 2,300-v line.

25% of the nation's power flows 432 installations of



OVER 8700 FEET of I-T-E Isolated Phase Bus is required for main bus, transformer and generator leads in this steam generating station. It is being used indoors and outdoors, on short and long runs, and along irregular building contours.

through 40 conductor miles in I-T-E Isolated Phase Bus

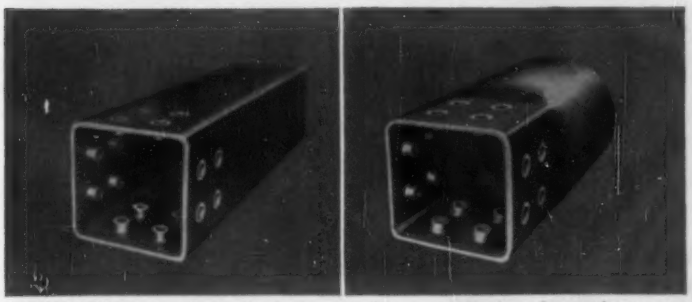
Metal-enclosed isolated phase bus was developed by I-T-E in 1936 to offer the highest degree of reliability and trouble-free operation for immense concentrations of power in limited areas. That it has more than achieved its objective is attested by the fact that I-T-E Isolated Phase Bus already carries 25% of the nation's power.

Among the 432 satisfied users are utility stations, industrial plants, and one of the world's largest hydro-electric plants.

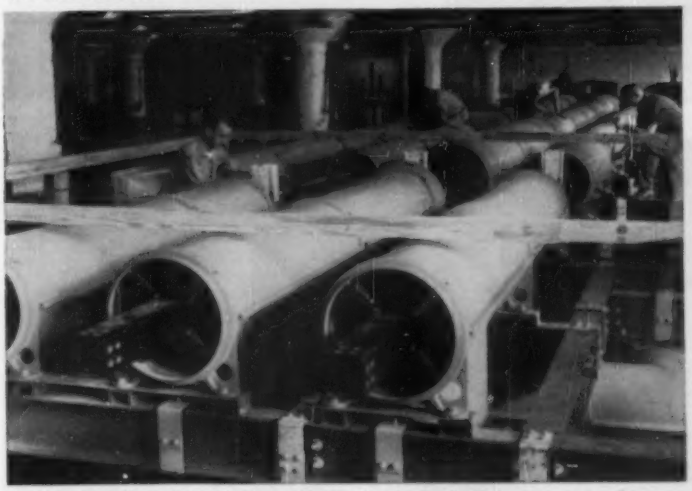
Not only has I-T-E Isolated Phase Bus established an enviable record for economy in installation cost and performance, but its simple construction has adapted it to a wide variety of applications. It is being used indoors and outdoors, on short and long runs, along irregular building contours. Its welded sections, unitized for ease of handling, reduce costs on straight runs. Even complicated connections such as are often necessary in existing structures are provided for in standard I-T-E design. And it has other advantages. Its construction is sturdy and compact. It eliminates phase-to-phase faults. It uses porcelain in compression only. It affords a high degree of safety to operating personnel. It requires a minimum of maintenance. Factory-assembled lengths simplify installation, cut erection costs.

For more information about I-T-E Isolated Phase Bus, and how it can help you meet your modernization and expansion requirements more effectively, write for Bulletin 10004A, I-T-E Circuit Breaker Company, Switchgear Division, 19th and Hamilton Sts., Philadelphia 30, Pa.

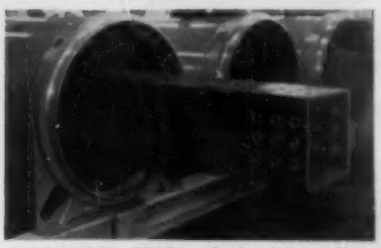
I-T-E CIRCUIT BREAKER COMPANY · Switchgear Division



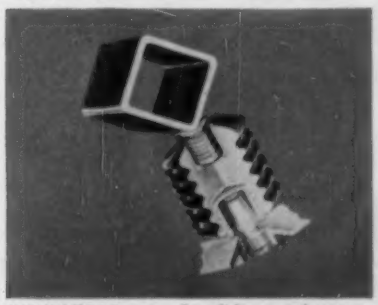
CONDUCTORS—one for each phase—are of copper or aluminum in round or square cross sections. Lengths up to 24 feet are joined end-to-end with solid, laminated or braided connectors.



CONSTRUCTION of I-T-E Isolated Phase Bus is simple. It is a structure of copper conductors, one to a phase, each enclosed in its own grounded metal shield. This basic design not only completely eliminates phase-to-phase faults, but permits rapid erection of prefabricated sections delivered to the job ready to fit in place.



SUPPORTING RINGS, of aluminum alloy, provide supports for insulators and connect the light metal cover electrically and mechanically to grounded steelwork. Tightly gasketed or welded aluminum covers make I-T-E Isolated Phase Bus suitable for indoor and outdoor use.



INSULATORS are of solid, nonaging porcelain, radially displaced to withstand compression. Insulators cradle conductors and allow free movement as the conductors expand and contract.

MANAGEMENT—
Industrial Relations

Monongahela Power's New

SECRETARIES of Monongahela Power, among company's more attractive assets, sun themselves on terrace steps of new building during noon hour. A snack bar opens onto the concrete terrace at head of steps

A recent visitor to the new general headquarters of Monongahela Power described it as "an extremely functional building that is everything such a building should be without being too plush." The pictures here illustrate the company's new offices.

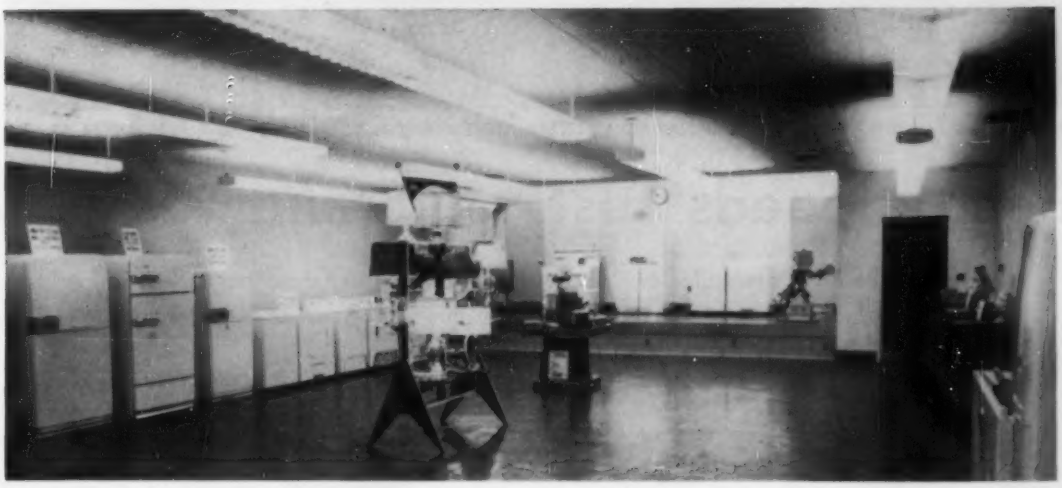
Erected at a cost of $1.5 million in Fairmont, W. Va., the building provides 50,000 sq ft of office space. It brings together various departments formerly scattered in four different buildings. The new building, its parking lot and surrounding lawn cover 3.2 acres of ground landscaped with trees, shrubs, and flowers. Located one mile from the center of Fairmont, it is within a block of the company garages and other facilities.

SNACK BAR is located on ground floor, opposite entrance to assembly hall, and is operated by Monongahela Girls Club, an organization of women employees in headquarter. Light snacks are supplied.

MONONGAHELA Power's new headquarters building is surrounded by attractively landscaped grounds and has 122-car parking lot. Building brings together departments formerly scattered in separate buildings

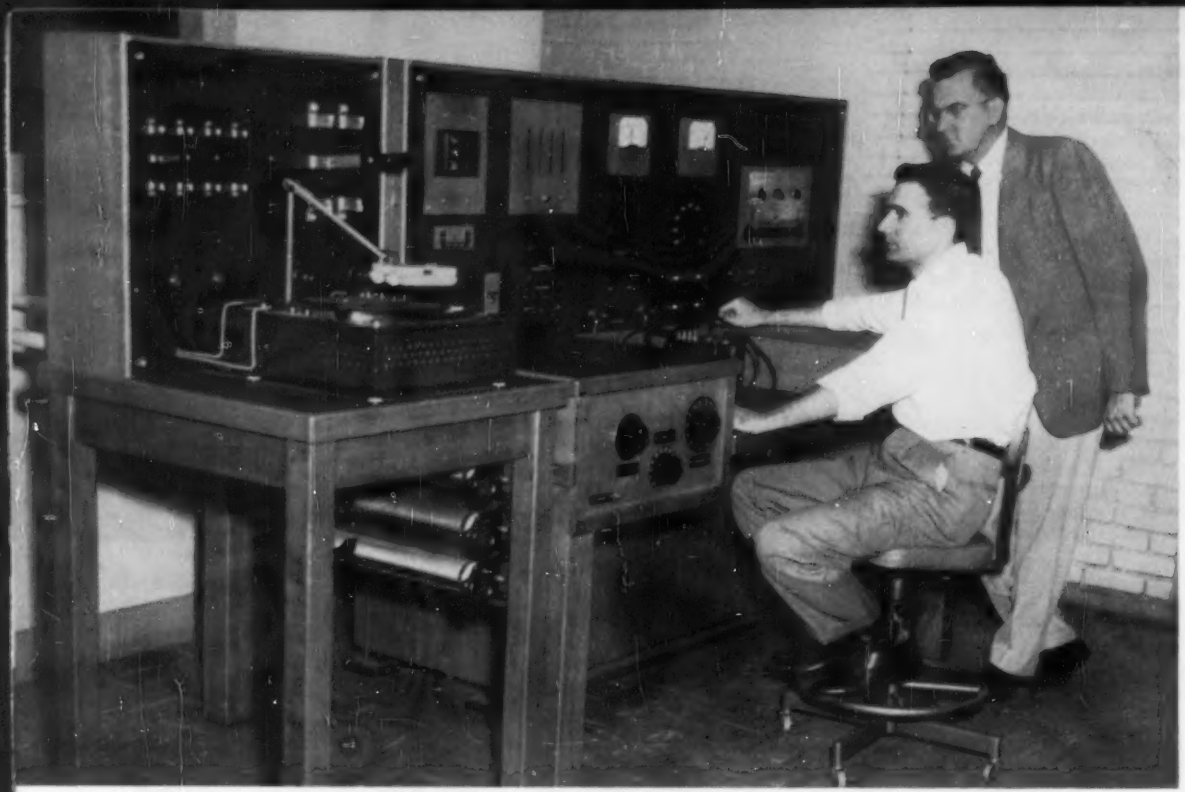
TEST KITCHEN located in new building is used for testing latest appliances and to prepare foods for demonstration. Ramp from kitchen to assembly room stage allows for fast and easy movement of material

Offices Marked by Functionalism



ASSEMBLY HALL is often used for displays of equipment and to introduce new lines of appliances. This large hall seats 200 persons comfortably. Movie projection equipment is built in. Stage is at far end

ACCOUNTING department is located on second floor and occupies one of largest office areas in headquarters building. The fluorescent light fixtures on each of the floors were supplied by a different manufacturer



NEW TESTING FACILITIES HAVE TEST BOARD AT RIGHT, TEMPERATURE CONTROL BOX UNDER TABLE, WATTMETER AT LEFT

Board Speeds Tests on Standards

NEES laboratory assembles equipment, including two separate photoelectric systems, for simpler calibration of its portable watt-hour meter standards

F. J. LEVITSKY, Assistant Engineer, Central Laboratory, New England Power Service Co, Worcester, Mass.

The central laboratory of the New England Electric System, Worcester, Mass., recently designed and built a board for testing portable watt-hour meter standards, using three special watt-hour meter standards without registers as secondary references. Its use of two separate photoelectric systems is believed to be a new approach to the calibration of watt-hour meter standards.

In assembling this test board, NEES sought to simplify and speed calibration of reference standards, as such calibration is performed against a wattmeter and clocks. These steps were taken:

1. Points to be tested were reduced to a minimum

2. A fast and accurate method of measuring partial revolutions was devised.

Faster Testing Afforded . . . The board and test procedures developed at Worcester afford a faster and more accurate test of watt-hour meter standards than the usual utility test which relies on an indicating wattmeter in combination with a timing device, often a pendulum clock. In the usual method accurate corrections for the wattmeter are obtained only by calibrations with shunts, volt boxes, potentiometers, and standard cells. Watt-hour meters are then calibrated by holding to a constant value in watts and measuring meter revolutions for a fixed-time interval, or by measuring time for a fixed number of revolutions. Such calibrations are long and tedious when many watt-hour meter standards are tested.

When watt-hour meters are used as references, however, testing is greatly simplified and results show much less variability. Although automatic watt regulators improve tests with indicating meters as standards, they correct but do not compensate for fluctuations wherever fluctuations cannot be reduced to negligible values.

As references, watt-hour meters must be accurately calibrated and hold to a stable performance. Removal of their registers minimizes friction effects, but introduces problems in calibration, particularly when use of a fixed-time interval requires measurement of partial revolutions.

Two-Point Calibration . . . With the NEES equipment, currents from 0.25 to 100 amp and voltages from 65 to 600 v may be obtained for operation of the field standards. High-precision, multi-range current and potential transformers are connected in their

protect your cable ends with

G&W potheads

There is a proper size and form for every size and type of cable!

Simple basic design details of G & W potheads, proven by years of satisfactory service, help provide trouble-free operation of cable circuits.

50th ANNIVERSARY G&W 1905-1955

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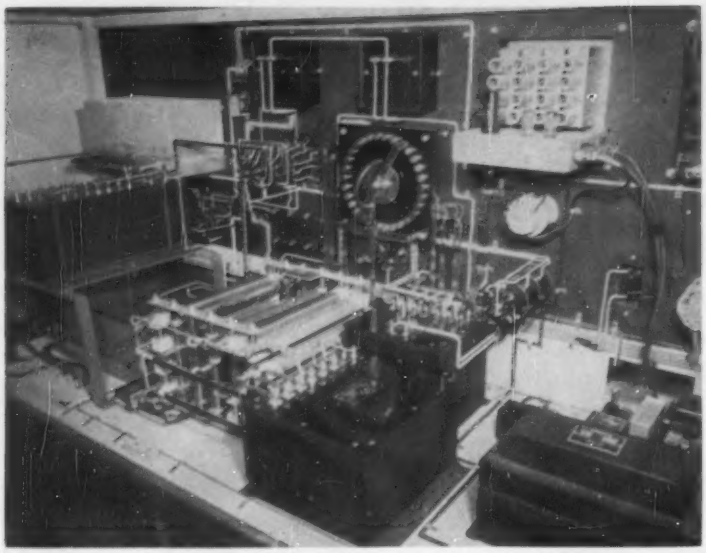
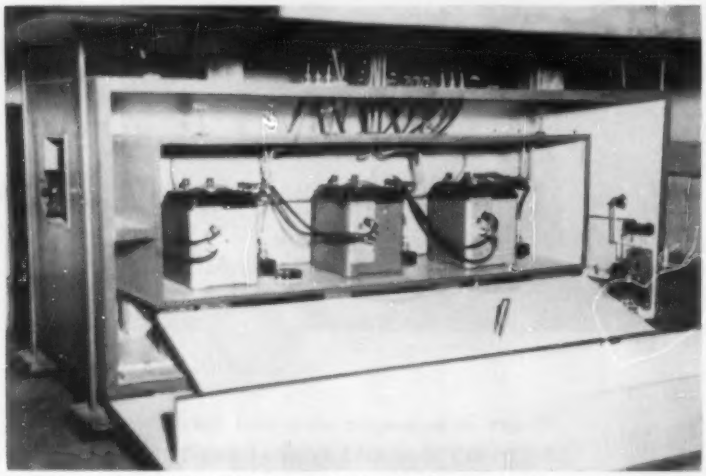
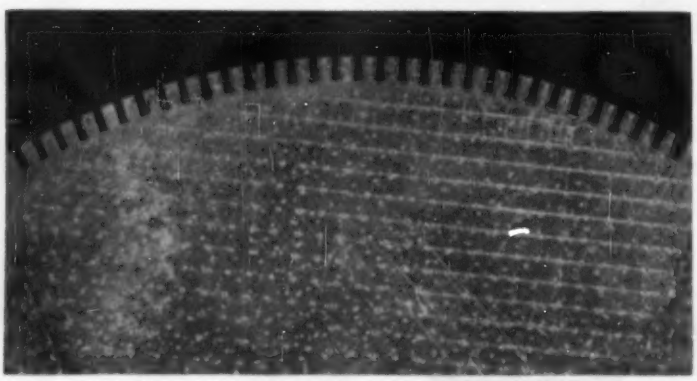


REAR VIEW of test board shows revolution counter (left), voltmeter, ammeter, and current selector (center), decade counter and voltage selector (right)



TEMPERATURE CONTROL BOX houses the three reference standards and maintains them at a constant temperature of 100 F to obviate ambient temperature errors



TEETH cut in edge of reference standard disc actuate photoelectric pickups

respective circuits to provide 5 amp and 120 v to the reference standards for all test loads. Consequently, the reference standards need calibration at only two points, at unity and at lagging power factor. This contrasts with calibration at 30 or more points.

Precision transformers, tested at the National Bureau of Standards for ratio and phase angle on each range, compensate for the secondary burden actually used. The current transformer ratio correction factor ranges from 0.9998 to 1.0001, and the phase angle from +0.1 to +0.7 min. For the potential transformer the ratio correction factor ranges from 1.0002 to 0.9997 and the phase angle is zero on all but the two ranges for which the phase angle is 1 min.

Calibrations of combined transformer errors at the commonly used calibration points are a maximum of 0.03% at 100% pf and 0.04% at 50% lagging power factor. In view of the repetitive accuracy of present portable watt-hour meter standards, these errors are insignificant, and no transformer corrections need be applied in routine calibration.

Partial Revolutions . . . Use of a fixed-time interval, which was retained in the NEES procedure, requires measurement of partial revolutions of the reference standards. With the register removed, this is a major problem, solved by NEES through the use of a high-speed electronic counter and special photoelectric pickups in each reference standard.

To actuate the photoelectric pickups, 200 evenly spaced teeth, approximately $\frac{1}{8}$ in. deep, are cut in the edge of the disc in each reference standard. A metal plate in which a $\frac{1}{2}$-in. x $\frac{1}{8}$-in. lattice has been cut is mounted over a segment of the metal disc, the lattice openings matching the slots in the edge of the disc to form a shutter. This lattice was introduced after it was found that the aperture between adjacent teeth did not permit enough light to actuate the phototube.

The light source of the photoelectric system is above the shutter and that of the phototube below it. As the disc rotates, light intensity on the phototube varies from a small value when the teeth in the disc are directly under the slots in the plate, to a maximum value when the slots in the disc are in line with the slots

(Continued on page 49)

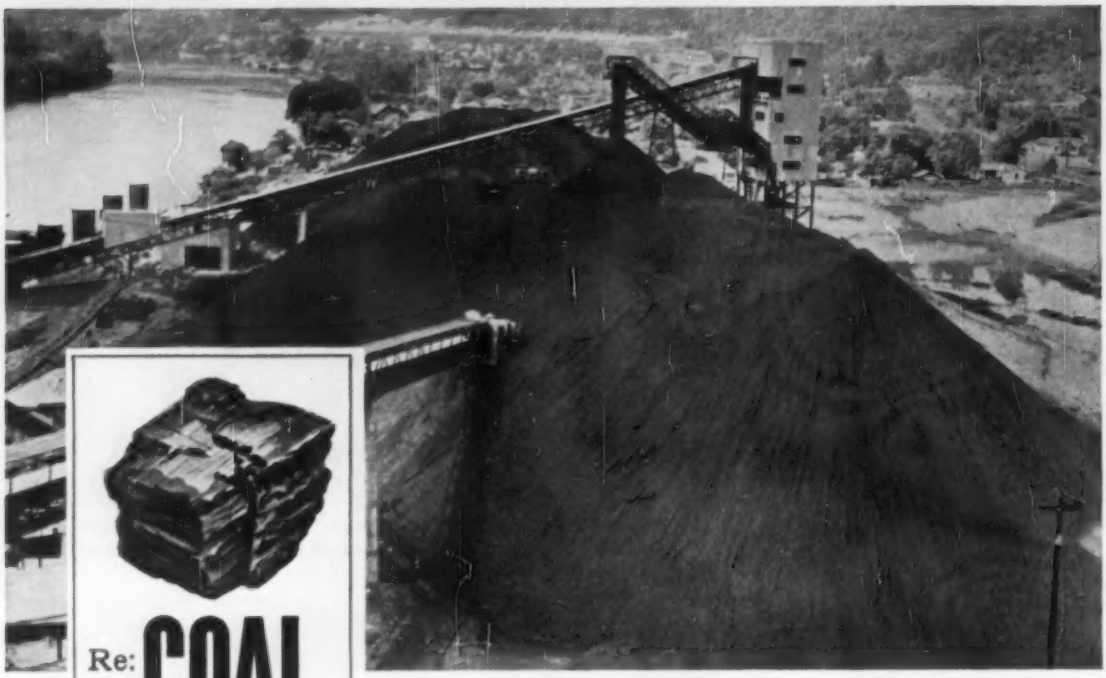
Buy Proved Insulator Performance

...it's WORTH the price!

LOCKE

LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND

Research for New Savings in Power Plant Operations



Re: COAL

HOW MANY MILLS PER KILOWATT-HOUR?

With fuel as the basic raw material of electric energy production, and with fuel cost amounting to as much as 80 per cent of your total production expense, ways to reduce this cost have long been a major subject for research. When you remember that the vast majority of power plants now operating or under construction are either coal burning or have provision for future coal burning, the importance of research in this direction becomes apparent.

Combustion and steam research—of prime concern to B&W—have already paid valuable dividends. For example, one important factor affecting mills per kwhr—Btu per net kwhr—has shown considerable advance. Before 1950 no plants were operating at less than 10,000 Btu per net kwhr.* Today there are a great many plants in this category, and one plant is being built for 8500 Btu. But only continuing research into all factors affecting fuel cost and combustion can bring further savings.

What are some of the problems? Can high-ash, low-fusion coal be used economically? Can units be designed for greater flexibility in using a wide range of coal? Can the preparation and handling of coal for combustion be simplified? Can burning methods be improved to reduce combustible and stack losses? Can the heat be utilized at still higher pressures and temperatures?

At B&W's completely integrated Research Center in Alliance, Ohio, some of the answers to these and other stubborn problems of combustion and steam generation are being painstakingly sought. Because B&W is particularly research-conscious the company is not willing to rest content on past achievements—like the Cyclone Steam Separator, Cyclone Furnace-firing, improved pulverized-coal-firing, higher pressures and temperatures, the Universal Pressure steam generator—for with complacency progress stops. Despite these and other significant advances B&W research continues at the same intensive pace to develop still more economical fuel burning and steam generating equipment. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

*Based on 1953 FPC reports.

G-703

BABCOCK & WILCOX

BOILER DIVISION

Standards Tests Speeded

(Continued from page 46)

in the plate, thereby giving 200 output pulses per revolution.

As these pulses are still too minute to be used directly, a two-stage amplifier has been mounted on the pick-up chassis. Amplified pulses are fed to a high-speed electronic counter, consisting of a wave shaper, amplifier, and four decade-counting units which give a direct reading of the number of pulses. The rated maximum input rate of the decade-counting units is 40,000 pulses per sec; the maximum input rate in this circuit is 55 pulses per sec.

Power Held Constant . . . The reference standards, running continuously, are calibrated by holding power constant, either manually or by an automatic watt regulator, while the clock relay contacts operate the start-and-stop circuit of the decade counter. A counter reading, divided by 200, gives whole and partial revolutions of the reference standards to the nearest 0.005 revolution, allowing calculation of performance values.

Accuracy of the decade-counting units is absolute, plus or minus one count. Consequently, percentage errors can be made small by making the total number of counts large and by using the average of the number of tests. Errors in starting and stopping count can be minimized by a start-stop relay with a rated operating time of 0.5 millisec. As the minimum time between incoming pulses is 18 millisec, the probability of obtaining spurious counts by input relay operation is small.

Another photoelectric pickup, mounted on each reference standard to calibrate standards brought to the laboratory from the field, is actuated by a hole in the disc. This hole supplies one pulse per revolution to the normal photoelectric meter tester which starts and stops the standards under test. Applying reference standard corrections to the register reading gives performance values for the field standards.

Three Standards . . . Use of three identical standards provides greater reliability in the secondary watt-hour reference. For relative accuracy checks on the standards, as well as for a counter accuracy check, switching is provided which allows the contacts of the revolution counter to operate the start-stop circuit of the decade counter. Through this switch, a check on the counters can be made by operating each counter from the same reference standard. In such a test, a one-revolution setting on the revolution counter produces a count of 200 ±1 on the decade counter, regardless of the speed or condition of the reference standard. Similarly, a ten-revolution setting produces a count of 2,000 ±1, providing a check on both counters.

When decade-counter input is connected to one reference standard and the revolution counter to another, the total count on the decade counter gives the relative accuracy of the two standards. Comparing the indicated difference in performance between standards with the difference between the posted corrections is a quick check on the relative accuracy of the standards. As long as the three standards agree, the likelihood of significant error in calibration is small.

Temperature Controlled . . . Reference standards are installed in a temperature controlled box and maintained at 100 F to eliminate errors due to ambient temperature. This device is a box within a box, the reference standards being in the inner compartment. Heaters are installed at the bottom between the boxes, and a 15-cfm blower and a baffle circulate the air. A thermal cutout on the floor of the inner compartment protects against overheating. When temperature rises too high, the thermal cutout cuts the power to the heaters and sounds a buzzer alarm. Tests show that temperature in the inner compartment varies only within 2 F.

For greater reliability, easy and quick checks can be made against primary standards. Reference standards may be readily checked at any time against the wattmeter and clock. When there is doubt of the wattmeter's accuracy, it can be immediately checked, without removal, by means of potentiometers and standard cells. Calibration data posted to the nearest 0.05% showed no change in the average calibration of the reference standards at either unity or lagging power factor during the first three months. During this period 52 tests on each reference standard at both power factor values revealed a stability considerably better than what had been indicated by previous experience.

MEETINGS CALENDAR

An extended list of coming meetings appears in last issue of each month

JULY

AMERICAN MANAGEMENT ASSOCIATION—Summer Program Colgate University, Hamilton, N. Y., July 6-Aug. 31.

NATIONAL ASSOCIATION OF RAILROAD UTILITIES COMMISSIONERS—Executive Committee Meeting, LaSalle Hotel, Chicago, Ill., July 8.

NATIONAL HOUSEWARES AND HOME APPLIANCE MANUFACTURERS EXHIBITS—Atlantic City, N. J., July 11-15.

AUGUST

NATIONAL SHADE TREE CONFERENCE—31st Annual Convention, Mar Monte Hotel, Santa Barbara, Calif., Aug. 1-5.

SOUTHEASTERN ELECTRIC EXCHANGE—Personnel Administration Section, Roanoke Hotel, Roanoke, Va., Aug. 11-12.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Pacific General Meeting, Butte, Mont., Aug. 15-19.

STANFORD RESEARCH INSTITUTE—Symposium on Electronics in Automatic Production, Sheraton-Palace Hotel, San Francisco, August 22-23.

WEST COAST ELECTRONIC MANUFACTURERS' ASSOCIATION—1955 Wescon Show, Fairmont Hotel, San Francisco, August 24-26.

SEPTEMBER

SECOND WESTERN AREA DEVELOPMENT CONFERENCE—sponsored jointly by Stanford Research Institute, the American Industrial Development Council and the Pacific Northwest Trade Association, Multnomah Hotel, Portland, Ore., Sept. 8-9.

ROCKY MOUNTAIN ELECTRICAL LEAGUE—Annual Fall Convention, Grand Teton Lodge, Jackson Hole, Wyo., Sept. 11-14.

PUBLIC UTILITIES ASSOCIATION OF THE VIRGINIAS—37th Annual Meeting, Greenbrier Hotel, White Sulphur Springs, West Va., Sept. 15-18.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—2nd Electrical Conference of the Petroleum Industry, Shamrock Hotel, Houston, Tex., Sept. 12-14; Industrial Electronics Conference, Rackham Memorial Auditorium, Detroit, Sept. 28-29.

ILLUMINATING ENGINEERING SOCIETY—National Technical Conference, Cleveland, Sept. 12-16.

Recent Labor Developments in State Capitals

New developments in the field of state labor laws affecting labor-management relations, as reported from state capitals, include the following:

Alabama . . . A pending state legislative proposal would modify Alabama's "right to work" law to allow union shop contracts in plants where 80% of the employees voted for them. The present law prohibits the union shop altogether.

California . . . Bills rejected by the California legislature included proposals for a so-called "right to work" law prohibiting the union shop and other forms of compulsory unionism.

Connecticut . . . A bill was enacted to "promote industrial peace" by stipulating that an employer cannot advertise for help if a strike is on at his place of business unless he states in his advertisement that the place is strikebound.

Also enacted was a bill to prohibit discrimination in advertisements of jobs because of race, creed, color, or national origin.

Delaware . . . Passed by the Delaware Senate and sent to the House was a bill to create a one-man State Department of Labor and Industrial Relations with jurisdiction over the State Unemployment Compensation Commission and the State Industrial Accident Board.

Iowa . . . A new Iowa law guarantees working persons three consecutive hours of free time to vote in general elections.

Maine . . . An opinion handed down by the Maine Law Court held that peaceful picketing for organizational purposes is unlawful in the state. The court ruled such picketing is an attempt to force an employer to perform an illegal act, to influence his employees to join the union.

Michigan . . . Bills rejected by the legislature included a "right to work" measure to outlaw the union shop and other forms of compulsory unionism.

Missouri . . . A bill revising Missouri's public utility anti-strike law, by stripping it of most of its present stringent provisions, was enacted by the state legislature.

Backed by union labor groups, the measure eliminated civil penalties of the law, including a fine of $10,000 a day for a labor union that invokes a strike against a utility and $1,000 for an official of a labor union who incites a strike.

Also eliminated was a provision for loss of seniority rights of every participant in a strike against a utility.

The only penalty in the revised act is that violation is a misdemeanor, carrying maximum punishment of a year in jail and $1,000 fine.

An extra waiting period before a strike could be instituted is set up by the new measure. This provides for an emergency board to step in after negotiation and arbitration have failed in the event of a dispute between workers and management.

It is further provided that the utility is held responsible for damage claims accruing during a period of state operation and that insurance and other benefits are continued.

New York . . . An opinion handed down by the Appellate Division of the New York State Supreme Court held that a union member need not stand trial before a union committee twice on the same charges.

The ruling was given in a case involving a member of the Telephone Employes Organization independent, who had been tried and cleared of charges of dual unionism. The high state court upheld a temporary injunction granted by State Supreme Court Justice T. A. Aurelio against a retrial by the union.

North Carolina . . . Bills killed in the North Carolina legislature included a measure to repeal the state's present statutory prohibition against the union shop and other forms of compulsory unionism.

Ohio . . . Defeat of an Ohio legislative proposal to bar union contributions to political campaigns was strongly urged by the United Labor Legislative Committee, representing four major labor groups.

Oklahoma . . . A controversial bill rejected by the Oklahoma legislature would have allowed the Grand River Dam Authority to enter into collective bargaining agreements with labor organizations.

Rhode Island . . . A bill enacted by the Rhode Island legislature provides for enforcement of arbitration clauses in labor contracts.

Texas . . . Bills enacted by the Texas legislature include a measure intended to prevent organizational picketing where a majority of employees do not wish to be represented by a labor union.

Also enacted was a bill to extend venue in trying alleged violation of other labor laws, such as the anti-mass picketing and anti-secondary strike law. Under the new law, suits can be filed either in the county of the alleged offense, in the residence county of any defendant, or if the state is a party, in Travis County (Austin).

Another measure given legislative approval is aimed at stopping payment of unemployment benefits to persons made idle by a strike of fellow union workers who supply parts. This bill stemmed from a strike a few years ago in which workers in the Ford plant at Dallas were idled by a strike of the same union in a Michigan plant.

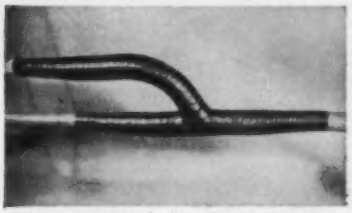
Vermont . . . Bills rejected by the legislature included a proposed so-called "little Wagner Act" to guarantee workers the right to organize and bargain collectively.

Wisconsin . . . In signing into Wisconsin law a highly controversial legislative bill banning political contributions by labor unions, Governor Kohler said he had studied the measure carefully and concluded it "actually restores rights to individual union members, rather than depriving them of political rights, as has been alleged."

Sponsored by Assembly Speaker Mark Catlin, Appelton Republican, bill was fought bitterly all the way through the legislature by Democrats.

UNUSUAL BRANCH CONNECTOR Saves Manhole Wall Space

With all the remarkable synthetic fibers appearing on the market, a lot of new plants are going up to manufacture them. One of the biggest plants ordered 28,000 feet of Okolite-Okoprene cable for its underground primary distribution system.



One of the interesting features of this big installation was their method of saving manhole wall space—an important consideration in all underground work. Since the cable was about 2" in diameter, it would have required around 24" space for training the tap, if a regular Tee joint was used.

Instead Okonite engineers worked out a preformed branch connector, in cooperation with a fitting manufacturer. From the picture you can see that by forming the connector instead of bending the cable the radius of bend was cut in half. Q.E.D.: only half as much manhole wall space was required.

Engineers at this plant weren't taking any chances with their cables . . . and they weren't taking any chances with their splices either. They made all their splices with Okolite, Manson and Okoprene tape.

It's good sense and good business to use a better tape and obtain a joint that's "spliced for life." The tape represents only a small fraction of the total cost of the job.

Why not send for a set of instruction sheets, EW-5678; you'll find them helpful.

. . . when you splice with:

AVAILABLE THROUGH AUTHORIZED DISTRIBUTORS ONLY

1441

Made by
THE OKONITE COMPANY
PASSAIC NEW JERSEY
SINCE 1878

SPECIALISTS IN ELECTRICAL WIRES, CABLES AND SPLICING MATERIALS FOR 75 YEARS

DISTRIBUTION
TRANSFORMERS
ATANA*

2. G-E SERVICE SHOPS—
MORE THAN 30 LOCATIONS

1. ENGINEERING HELP—
SALES & APPLICATION ENGINEERS,
TRANSFORMER SPECIALISTS

3. REPLACEMENT PARTS—
FOR UPRATING OR REBUILDING

4. G-E WAREHOUSES—
45 STOCKING POINTS

Four areas which show that

SERVICE HELP IS AVAILABLE

Here's the kind of help available with every General Electric distribution transformer you buy:

Engineering help. Sales and application engineers, transformer specialists are available to every customer. Highly trained, these men can provide valuable assistance in your planning or day-to-day problems.

G-E service shops—31 throughout the country—are as close as your telephone. They are ready to help you in any emergency or to give routine service in your maintenance program.

Replacement parts permit uprating or rebuilding. Whether it's a complete core-and-coil or just a broken part, G.E. is ready to help you. We can furnish the parts or do the whole job.

G-E warehouses. 45 easy-to-reach places where thousands of G-E transformers are stocked. You can get off-the-shelf delivery of almost all standard ratings. 431-24

*ATANA - When you need service, remember *All Transformers Are Not Alike* and go where the help you need is always available. General Electric Company, Schenectady 5, New York.

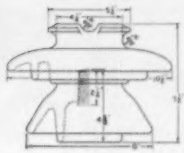
CONVENTIONAL—SELF PROTECTED
take your choice
General Electric makes both

Progress Is Our Most Important Product

GENERAL ELECTRIC

America's Finest!

VICTOR NO. 245
TRANSMISSION
PINTYPE
(Radio-Freed or Plain)



VICTOR
Purified Porcelain
Transmission Pintypes

VICTOR Transmission Pintypes are America's finest because VICTOR "Know-How" has endowed them with extra long life under even the most severe conditions of service. Made of VICTOR *Purified* Porcelain—they are the finest insulators skilled craftsmen and modern research can produce. Victor Transmission Pintypes are designed with thick, rugged, rounded corrugations for maximum strength and resistance to impact. They have large radius top and side-wire grooves to permit use of new larger conductors, and smooth hard glaze that protects against weathering and contamination. Each is thoroughly inspected at every stage of manufacture. You just can't buy a better insulator!

FEATURES

1. **UNEQUALLED STRENGTH,** thanks to *Purified* Porcelain—finest insulator porcelain ever made!
2. **CUSHION-COATED JOINTS**—special coating at joining surfaces absorbs thermal variations and mechanical shock.
3. **THICK, RUGGED CROSS-SECTION** plus rounded edges give maximum strength, protection against impact, cut replacement costs.
4. **LARGER RADIUS TOP AND SIDE WIRE GROOVES** permit the use of new, larger conductors.
5. **SCIENTIFICALLY COMPOUNDED GLAZE** gives maximum strength and a smooth, self-cleaning surface.
6. **CONTROLLED TESTING AND PROCESSING OF CEMENT** assure highest bond strength at assembly joints.

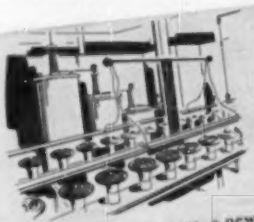
SPECIFICATIONS

60 cycle dry flashover	125 KV
60 cycle wet flashover	80 KV
Positive impulse flashover*	200 KV
Negative impulse flashover*	265 KV
Dry arcing distance	9½"
Leakage distance	21"
Pinhole diameter	1⅜"
Rec. pin height	8"
Cantilever strength	3000 lbs.
RNI (plain)	16,000 microvolts
RNI (radio-freed)	200 microvolts
1000 KC at applied	30 KV

*Crest KV. 1½ x 40 microsecond wave Critical Value.

For the full facts on Victor "Know-How," write for "The Story of Victor and Purified Porcelain." For engineering data on Victor insulators, write for Bulletin No. 4.

NEWS FROM VICTOR



As part of its continuing modernization program, a new 60 cycle, 225 KV continuous flashover tester has been installed in the VICTOR plant. By means of this new equipment, the operator is able to attain more accurately regulated 60 cycle flashover to a definite time standard, thus attaining maximum effectiveness in conducting routine flashover tests.

SPECIFY VICTOR
Purified Porcelain
Pintypes

VICTOR INSULATORS DIVISION
I-T-E CIRCUIT BREAKER CO.
VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains
Spools • Switch and Bus Insulators • Custom Designed Porcelain
Insulator Hardware

Fluorescent Street Lighting:

Will It Take Over?

Progress in product, application, say manufacturers could make fluorescent tube as familiar on highway as in plants and stores

What is the fluorescent tube's future as a street light?

It appears to be not only bright, but brilliant to at least two electrical manufacturers, General Electric Co and Jefferson Electric Co.

A GE executive, in fact, has declared it would replace most other forms now in use in the next decade. Henry J. Chanon, marketing manager of GE's Outdoor Lighting department, said that simple economics will be a significant factor in this transition.

"Although initial cost of fluorescent street lighting now is higher than either incandescent or mercury," he declared, "it already has proved to be substantially more economical in operation than either incandescent or color improved mercury. It is rapidly reaching the point where it will not only be better, but also more economical than standard mercury."

Chanon said the phenominal swing to fluorescent in industrial and commercial lighting is an indication of things to come in street lighting. Items:

- In only the past few months, the number of electric utilities with fluorescent street lighting on their lines has increased tenfold;
- Many communities are utilizing fluorescents to arrest migration of business from downtown areas to outlying suburbs.

New Roadbuilding Will Help

Concurring in this optimism is Jefferson Electric's President Edward J. Bennan. He sees the sharp increase of new construction of highways, toll roads, and modernization of older street lighting systems as a particular shot in the arm.

"The mercury lamp to date has been the greatest single improvement in road lighting," he said. "It will continue to be a tremendous factor. But now a street lighting fixture which houses a six-ft fluorescent lamp has been introduced. This means fluorescent lighting can be used for streets, highways and shopping developments. We are working on a line of transformers to operate the fluorescent street lamp, and will introduce it this summer."

One of the major advantages of fluorescent street lights is that they are glare-free. Drivers can look at the light source without impairing seeability.

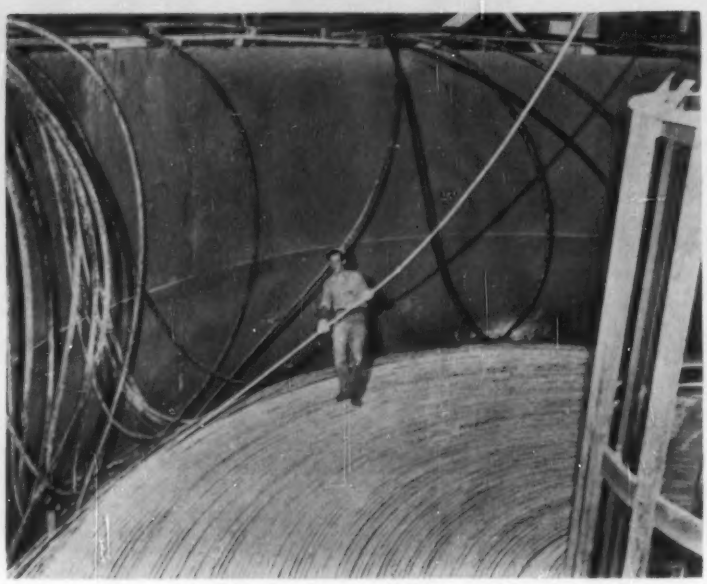
And going a step further, California's Division of Highways has come up with a fluorescent fixture luminaire which cuts down glare on wet pavement. Equipped with 200 w of fluorescent light source, it throws 1 ft-c of light further out on the pavement with less wasted sidelight than 600 w of incandescent light. It is being used extensively at the present time on coastal highways in the northern part of the state (picture above).

Parabolic Reflector

The luminaire consists of a parabolic reflector behind an 8-ft, T12, 5,800-lumen lamp. The reflector, made in two 4-ft sections, is at a 70-deg angle with the vertical. A flat reflector is above the lamp, inclined at a 70-deg angle and about 2½ in. from the lamp center. This allows only 1½% of the incident light to show above 76 deg. It redirects all light between 80 deg and that redirected by the parabola onto the pavement, thereby reinforcing the direct light from the lamp.

How is it used? The 32 units installed on the Burns Freeway near Arcata, Calif, have two separate lamp and reflector units back-to-back. Over 1 ft-c of pavement illumination is produced 45 deg out in each direction from the fixtures. Each unit has a glass fiber housing and is open so dust and moisture cannot accumulate.

Because these luminaires are designed for use in coastal areas, consideration has been given to use of coatings on aluminum reflector surfaces to reduce the corrosive effect of salt atmosphere. On the San Francisco-Oakland Bay Bridge reflectors have been successfully maintained by refinishing and recoating the specular surface with methacrylate resin lacquer. Lamps have to be changed and reflectors refinished about every two years.



Atlantic Cable to Link Phones

Laying of the world's first transoceanic telephone cable system began June 22. Costing about $40 million and comprising two individual cables, the system (EW, Dec 27, 1954, p 110) will connect Newfoundland and Scotland. Voiceways between Newfoundland and the United States will be provided by means of another submarine cable in conjunction with a 575-mile radio relay link.

The deep-sea cable is being manufactured by Simplex Wire & Cable Co and Submarine Cables, Ltd. Simplex stored the cable in a giant tank at its Newington, N. H., plant (see illustration). Loading of the cable aboard HMTS Monarch, the cable-laying ship began June 8.

Core of the deep-sea cable is a single concentric conductor surrounded by polyethylene and encased in a flexible copper tube, which is about ⅝ in. diam. Protecting the core are layers of jute and armor wire. For the shallow water shore ends, where greater protection is required, the cable will be more than 2½ in. diam and weighs almost 9 lb per ft. The deep-water portion is about 1¼ in. in diam and weighs one lb per ft.

Each of the two cables will be equipped to transmit speech in one direction so that a total of 36 conversations can be carried simultaneously. They will not provide television service.

To amplify the signals, 52 repeaters will be spliced into each cable, about 40 miles apart. The repeaters, housed in a flexible copper tube about 8 ft long and 1¾ in. diam, employ three vacuum tubes and 60 other components.

Canadian Westinghouse Gets Transformer Order

Canadian Westinghouse Co Ltd has been awarded a contract for the manufacture and installation of thirteen 60-cycle power transformers for the Canadian powerhouse of the St. Lawrence Power Project, according to a recent announcement by the Hydro-Electric Power Commission of Ontario. Total contract is for about $1.25 million.

This is the tenth St. Lawrence contract let by Ontario Hydro since construction officially started last August. It raises the total amount authorized by the Commission for construction work, and materials and equipment to more than $32 million.

Initial delivery of power is scheduled for 1958, with completion of the entire project in 1960.

Atomic Fuel Element Fabricated by Sylvania

An unclassified atomic fuel element has been fabricated by Sylvania Electric Products Inc for use in the research reactor at Brookhaven National Laboratory. Stanley B. Roboff, manager of industrial coordination of Sylvania's Atomic Energy Division, says the element is safe to handle, prior to its use in a reactor.

The element consists of three aluminum-clad fins approximately 30 in. long and held together at the ends by aluminum rings approximately 2.5 in. diam. Inside the aluminum cladding or covering is a thin layer of uranium-aluminum mix.

Roboff predicted that at least 50% of new electric generating stations built in the United States in 1980 will be atomic powered. He predicted the average citizen will receive the benefits of atomic energy, but will be far removed from close proximity to atomic reactors and materials.

Revere Develops New Conductor Alloy

Revere Copper and Brass Inc has developed a new aluminum alloy designed to satisfy the need for a light weight, high strength conductor. The new metal, called Revere Alloy 6263, is the result of joint research between Revere and the Aluminum Co of Canada.

According to the manufacturer, the new alloy fills the need for a conductor material with greater mechanical strength than Revere's EC grade aluminum alloy. Whereas EC has somewhat higher electrical conductivity than the new alloy, its mechanical strength has barred its widespread use in busway applications. Like the EC grade, alloy 6263 has excellent corrosion resistance and can be silver plated, says the manufacturer.

Aluminum Production

Primary aluminum production, as reported by the Aluminum Association in New York, was 126,394 tons in April. This is a decline from 130,272

(*Continued on page* 59)

ROEPLASTIC CONTROL CABLE

Since Roebling pioneered this unique type of cable three years ago sales and repeat orders have skyrocketed—sure proof of outstanding merit.

No painted conductor tracers. Conductors are *one* dark color, each with its IPCEA code color *name* and its *number* distinctly printed from end to end with indelible plastic ink which forms an integral part of the insulation and cannot be erased.

YOU WANT

FREEDOM FROM ERRORS...
CONDUCTOR IDENTIFICATION
THAT IS SIMPLE AS A, B, C
YET ABSOLUTELY POSITIVE...
IN SHORT,

YOU WANT

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 19225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 916 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

5 connections

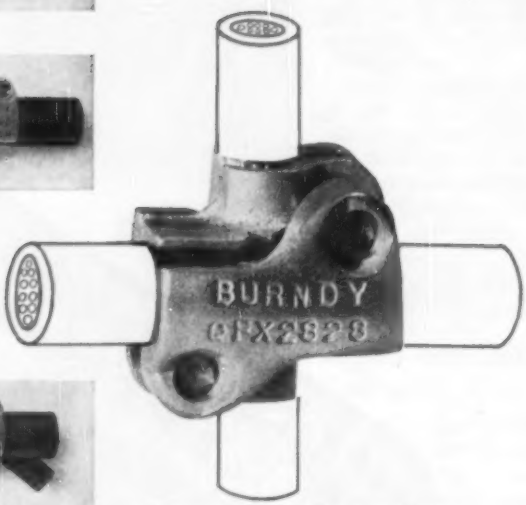
END TO END

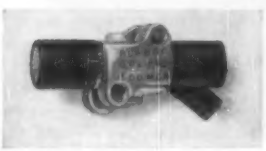
TEE

PARALLEL

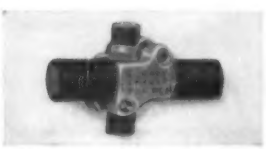
1 connector

Versitap





TAP



CROSS

Because each Versitap size takes a wide range of conductor sizes in each groove, you need only a few sizes to make any of 5 types of connections on cable sizes #6 through 1000 Mcm. You get *sound* connections, electrically and mechanically . . . you get them *quickly, easily* . . . and you get them with a *minimum stock*. Re-usable, too.

See Burndy Catalog 52 for details.

BURNDY

NORWALK, CONNECT. FACTORIES: NEW YORK, CALIFORNIA, TORONTO EXPORT: PHILIPS EXPORT CORPORATION TORONTO, CANADA

53-5

Aluminum Production

(*Continued from page 56*)

tons in March, but up from 120,438 tons in April, 1954. For the first four months this year the total production was 501,105 tons compared to 469,502 tons for the same period last year.

Hubbard Guarantees Lightning Arresters

The Autogap lightning arrester which Hubbard and Co introduced 15 years ago has performed so well that it now carries a five-year warranty against failure due to defective material and workmanship.

Charles L. Stroup, Hubbard vice president in charge of research and development, said the warranty became effective June 1, 1955. Under the warranty, Hubbard will provide a new unit without charge if an arrester fails due to material or workmanship within five years.

Star Kimble Develops Mobile Power Unit

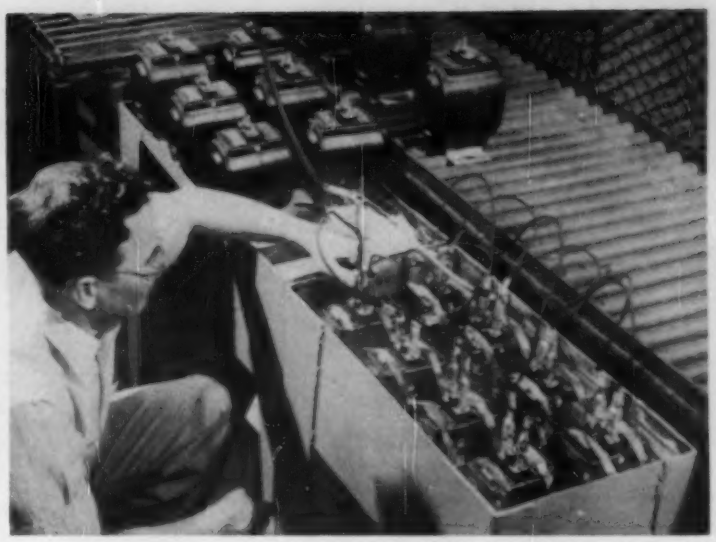
Star-Kimble Motor Division has developed a 10-kw portable power unit designed to facilitate the use of power tools and motor driven equipment during emergency operations or at locations away from power lines. "MOBIL-AC", as it is called, is driven by the engine of the vehicle on which it is carried to supply single and polyphase ac at commercial voltages (110-220 v) and frequencies.

Units rated 3, 5, and 10 kw are available, says the manufacturer.

Duty-Free Copper Bill Passed by Senate

A bill allowing the import of copper into this country for another three years without payment of duty, was recently passed by the Senate and sent to the White House. The bill continues until June 30, 1958, the present suspension of the 2¢ a lb import duty on copper.

The bill automatically revokes the suspension if the average price of copper falls below 24¢ a lb.



A-C Kit Adapts CTs to Higher Voltages

The "do-it-yourself" fad has now entered the electric utility industry in the form of a conversion kit for current transformers, according to W. C. Farneth and G. Gallousis of Allis-Chalmers Mfg Co. The kit will enable utilities to convert A-C's standard, epoxy resin cast, window-type, 600-v, indoor-outdoor type current transformers to 5,000-v insulation class bar type units. Supplied in the kit are an insulated primary conductor, two primary bushing inserts and terminal pads, and necessary gaskets and instructions.

Advantages of the kit are said to be that it reduces transformer stock requirements, lowers the cost of 5,000-v units and simplifies handling in outdoor service since weight and size are considerably reduced.

Primary conductor is an epoxy resin insulated copper rod threaded at both ends. Copper rod is passed through the 600-v CTs primary opening into which are fitted the epoxy resin bushings. Primary terminal pads hold the entire assembly together. Converted transformers have withstood 5-kv insulation class, 60-cycle and impulse tests in addition to a thermal cycle test.

Basic 600-v CTs are available in 200-5, 400-5, 600-5 and 800-5 amp ratings. Illustration shows CTs being tested in saline solution to detect defects in resin castings.

American Standards Published or in Process

American Standards Association has revised the status of the following Standards.

Published—Specifications for Dry Cells and Batteries, C18.1-1954; price $0.25. Requirements, Terminology, and Test Code for Instrument Transformers, C57.13-1954; price $2.50. Method of Sample Preparation for Physical Testing of Rubber Products, J1.1-1955; ASTM D15-54T.

Approved—Asbestos, Asbestos-Varnished Cloth, and Asbestos-Thermoplastic Insulated Wires and Cables, C.8.36-1955 (NEMA WC1-1955).

In Standards Board—Definitions of Terms for Audio Techniques, C16.24; 54 IRE 3.S1. Wet Process Porcelain Insulators: Suspension Type, C29.2 (EEI TDJ-52; NEMA 140-1952); Spool Type, C29.3 (EEI TDJ-53; NEMA 141-1952); Strain Type, C29.4 (EEI TDJ-54; NEMA 142-1952); Low and Medium-Voltage Pin Type, C29.5 (EEI-TDJ-55; NEMA 143-1952); High-Voltage Pin Type, C29.6 (EEI-TDJ-56; NEMA 144-1952); High-Voltage Line-Post Type, C29.7 (EEI TDJ-57; NEMA 145-1952). Definitions of Terms of Electron Tubes, C60.9. Definitions of Terms of Magnetrons, C60.10. Definitions of Terms of Gas-Filled Radiation Counter Tubes, C60.12. Specs. for Deep Well Vertical Turbine Pumps, B58.1.

Project Initiated—Terminology for Automatic Controls, C85.

BUSINESS OUTLOOK

Electrical World
JULY 4, 1955

The outlook, in brief: Industry will keep operating at a high level for the rest of 1955. Some factories will cut operations, as usual, for summer vacations. But they'll pick up again in the fall. So industrial output in the second half won't be much below the record first half. This spells continued high power sales to industry over the next six months.

Industrial production has already bettered all previous records. The Federal Reserve Board's index hit 138 in May and probably stayed about that high in June. In contrast to 1953, the boom this year is broadly based. Almost every industrial group has upped production steadily since January. And most important, very few of these industries have built up much inventory. So it's hard to find a weak spot.

Here is an industry by industry run-down for the next six months:

Steel mills, running at better than 96% of capacity in recent weeks, have produced about 58 million tons so far this year. The demand for steel won't slacken much in the next half. Machinery makers will increase their steel requirements and partly offset a drop in auto demand for steel. This means 110 million tons of steel in 1955—25% above 1954.

Production of **nonferrous metals** is also running 25% ahead of 1954 and will probably stay that way for the next six months. Demand continues to outrun supply. So prices may continue up. And it seems certain that prices of **fabricated steel** and **nonferrous** products will be increased to cover wage boosts.

The **chemical industry** also has bright prospects for achieving its best year ever. Output is up over 10% above first half of 1954. And second half output will go right on up.

Petroleum refining is going strong too—7% above last year. Inventory build-up may slow activity. But with more cars on the road and more oil burners in new homes, gains over 1954 are likely to be held.

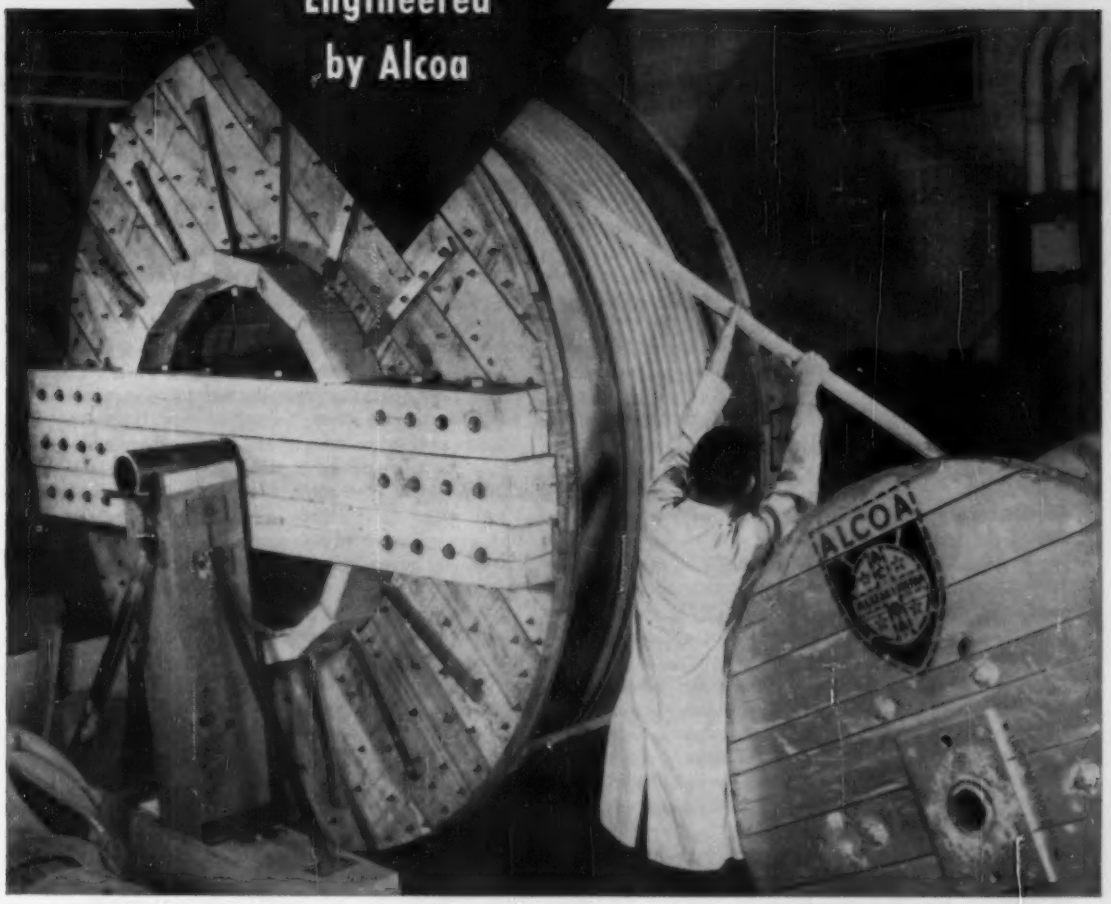
Consumer durables industries will not do as well in the next six months as they have in the past six. Examples: autos, radios and TV. Inventories are building up fast, so second half output will have to slow down.

Auto output, especially, will slacken through the summer. That's normal seasonally—but it may be more true this year than most. The large build-up in inventories (over 850,000 in dealers hands) spells trouble ahead. With 4.3 million passenger cars produced in the January-June period, about 6.8 million cars will be turned out this year. But, many are going to used car lots, not to retail customers. **Radio and TV** set production also spurted in the first half—has to slow down in the second.

Makers of **electric appliances** are cashing in on the tremendous spurt in new housing construction. The 1.4 million new homes that will be completed this year mean a good year indeed for sales of all appliances.

What's behind it all? Just one thing: consumer incomes at the highest level ever. Total personal income topped $295½ billion in April and will continue to rise through the rest of the year. The new round of wage increases will see to that.

Mile Long 3,000,000 CM All-Aluminum Conductor Engineered by Alcoa



Your Guide to Aluminum Value

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA
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A mile of two-inch, all-aluminum cable is used for a 15,000-pound inductance coil in experiments now under way at the Engineering Research Institute of the University of Michigan. Capable of storing three million watt-seconds of energy, the coil was wound with cable that was specially engineered and produced by Alcoa for the university's study of the properties and applications of electric discharges.

The same Alcoa cable engineering and production facilities which solved the unusual technical problems of this project are at your service. They are the best staffed and equipped to handle your special conductor needs.

When you have a conductor engineering problem, call your local Alcoa sales office. Or write, Aluminum Company of America, 2313-G Alcoa Bldg., Pittsburgh 19, Pennsylvania.

ALWAYS USE ALCOA® ALUMINUM ACCESSORIES WITH ALUMINUM CONDUCTORS

IN THE INDUSTRY

Northwest Faces Generation Squeeze

Companies are ready and able to meet power demands, but FPC and Congress have final say on how and when water power projects are to be developed

Portland, Ore.—"If we have to struggle along on the dough we get from Congress, we just can't hope to grow and bring new industry here." That's a thought you hear over and over again as you discuss electric utility operations with people here in the Pacific Northwest. Utility men, business men, and other thinking citizens are coming to realize that the day is long past when the region could lean on the federal government for its electric power requirements. It must now look to other more dependable sources for its power financing.

New locally and federally financed generation projects scheduled to come in between now and 1960 offer some assurance that the more pressing power needs in such states as Oregon and Washington can be met up until that time. In Idaho the demand is more immediate. Idaho Power Co must provide a substantial quantity of additional generating capacity by 1958 or face a power deficit in its service area. This problem is uppermost in the minds of utility men in the area.

Hydro is more economic . . . The rich hydroelectric potential of the mighty Columbia River and its tributaries are at once the key and the stumbling block to providing the new generating capacity which the region so desperately needs. They are the key because they hold in their rushing currents the energy to develop scores of millions of kilowatts in electrical power.

Ten, maybe 15, million kilowatts of this potential can be developed more cheaply here than can electric power from any other known source. Utility men talk in terms of three and four mill bus bar power from hydro as compared with five and six mill power from efficient steam plants. Thus the economics of the situation strongly favor hydro development.

The Columbia and its tributaries become the stumbling block to reasonably rapid and orderly power generation development because a small but vocal coterie of politicians and pressure groups has chosen to make a political football of this development. Adding to their efforts are the slow and ponderous processes of federal decisions and federal regulation.

In the past years the federal government has poured hundreds of millions of dollars into this region to develop hydroelectric power. Millions of kilowatts of capacity have been added to that developed by electric companies and other local interests. But in the postwar years when loads were shooting skyward the Congress in Washington gradually tightened the federal pursestrings. This has happened during both Democratic and Republican administrations and with little regard as to which party held a majority in Congress.

Now power demands are mounting so rapidly that there is real doubt as to whether the federal government could continue to meet them no matter how favorable public officials may be to the region. During the next ten years utility officials here, government and company alike, forecast additional generation investment will have to be some $3 billion or more. Even the more optimistic among the devotees of government power have trouble visualizing the federal government laying out this amount of cash for the further development of a rich and prosperous region.

Companies have an answer . . . Electric companies in the area have come forward with numerous positive proposals for avoiding the power bottleneck that faces the region in the near future. They have offered to help finance federal projects, develop other projects either singly or in groups. More than two score applications for permits and licenses are pending before the Federal Power Commission.

Protesting these proposals are the men who want to hold onto times past when a paternal federal government poured out millions for Northwest power. They have no constructive alternative, but insist on using a minority veto to stymie the Northwest's industrial growth.

TECHNICAL NOTES

Wire heights and separations can be determined by means of a modified commercial optical range-finder in which contrasting images are employed to determine distance from observer.

Cooling towers are frequently economical when large expenditures for (1) storage reservoirs, (2) intake structures, or (3) long transmission lines are avoided.

ACSR with steel core insulated by synthetic rubber could operate in icing weather with load current confined to the core to generate sleet-melting heat for the composite conductor.

Loudness level for some complex sounds covering a wide frequency range may be 5 to 15 phons higher numerically than the sound pressure level.

Noise tends to decrease relatively as carrier frequency increases. This somewhat offsets the corresponding increase in line attenuation at higher frequencies.

Oak, red maple, ash, and hickory are resistant to foliage spray. Basal spray is more effective in controlling the growth if equal parts (2 lb) of 2,4-D and 2,4,5-T are dissolved in 100 gal of No. 2 fuel oil and applied to saturate the lower 15 in. of the base.

NARUC Views Depreciation

Joint committee considers deferral a permanent tax reduction, according to proposed draft of recommendations

The proposed recommendations of the Joint Committee on Depreciation and of the Committee on Accounts and Statistics of the National Association of Railroad & Utilities Commissioners indicate that joint committee considers the so-called deferral a permanent reduction in taxes and, consequently, feels that the consumer should get the benefit of such reductions. These recommendations are contained in what is understood to be a preliminary draft.

The general tenor of the joint committee's report is indicated in the following statement: "The accounting question here considered by the committee is whether a deferral of income taxes should be recognized in the accounts if a utility uses liberalized depreciation for income tax purposes and charges on its books a smaller amount of depreciation as indicated by the straight-line or other method used by the utility for corporate record purposes."

Tax Reduction: No Deferral

"If the tax effect occasioned by liberalized depreciation is a tax reduction, then, obviously, there is no deferral of taxes. Accordingly, our research has been directed to determining the relative permanency of the tax savings resulting from liberalized depreciation, assuming continuance of the present statutory provisions."

The joint committee was very specific in differentiating between accelerated amortization, as provided under Section 168 of the Internal Revenue Code, and Section 167 which provides for liberalized depreciation. It said in part, "The latter procedure (i.e. accelerated amortization) [Parenthesis supplied] results in a saving for a definite five-year period and it is normally to be expected will be followed by a period of higher tax payments. In contrast, liberalized depreciation results in tax reduction for an indefinite period of time which may be very long, and in fact, may be continuous."

The report continued significantly, "Although it can be shown for a single unit of property that the higher annual charges for liberalized depreciation in the early years of life will be followed by reduced charges in later years, a different picture is presented when the procedure is applied to property comprised of a large number of units as is characteristic of utility plant.

"Under these conditions, liberalized depreciation will continually result in annual charges higher than the usual straight-line method if the plant continues to grow; and even if the plant should become static after having attained a stabilized age distribution, the annual liberalized depreciation charges would not be less than those under the straight-line method."

In support of the foregoing position, the joint committee mentioned both Prof Robert Eisner's article in the January-February issue of the Harvard Business Review as well as Willard F. Stanley's recent book called "New Rapid Tax Depreciation."

In view of this, the report said: "The committee is convinced that the use of the liberalized depreciation procedures permitted by the 1954 Revenue Act results in tax reduction, not tax deferral, and that it would be contrary to sound accounting principles and to the provisions of the Uniform System of Accounts to record such tax reduction in a deferred credit account."

Three Proposals Outlined

The report outlined three proposals for the rate-making treatment of liberalized depreciation. It said: "The real regulatory problem in connection with tax reduction arising through liberalized depreciation is how to treat the *tax reduction* [Italics supplied] in fixing rates for service. This of course is not an accounting matter; however, the committee does have some thoughts on this question and believes the following suggestions are worthy of consideration:

"(a) Permit the amount of liberalized depreciation to be recorded in the accounts and allowed for rate purposes. In theory, this would require higher rates to cover the additional depreciation less the effect thereof on income taxes; or

"(b) Permit additional depreciation to be charged in the accounts and allowed for rate purposes equal to the tax reduction caused by liberalized depreciation. This procedure would have no immediate effect on net income and on rates for service although in the long run it would be favorable to consumers if the additional accumulated depreciation is deducted in determining the rate base; or

"(c) Permit depreciation charges under present practices to be recorded in the accounts and allowed for rate purposes with the tax reduction from liberalized depreciation being reflected in tax expenses. Theoretically, this procedure would pass the income tax reduction on to consumers via lower rates."

Recommendations Interesting

The committees' recommendations are particularly interesting in that they are in direct opposition to the views expressed by Federal Power Commission Chairman Jerome K. Kuykendall before the Senate Finance Committee during its hearings on H.R.-8300, when he said: "The commission recommends that Congress expressly provide that Sections 167 and 168 be applicable to public utility companies, whether intrastate or interstate and in the committee report state that no change in Congressional policy is thereby intended from that covered by Section 124A of the Internal Revenue Code. If Congress should follow this recommendation, the commission is of the opinion that further provision should be made for retention by the utilities of any tax savings thereby realized so that the tax savings could not be paid out in dividends or used to reduce rates temporarily."

The relationship of Sections 167 and 168 of the Internal Revenue Code is, of course, important since the FPC granted the use of normalized taxes, both under its Opinion 264, which is a general order applicable to Natural Gas Companies, and Opinion 269, in the matter of Panhandle Eastern Pipeline Co.

In addition, while no rate-making orders have been issued "per se," seven State Commissions have issued accounting orders prescribing normal-

(*Continued on next page*)

Depreciation Views

(Continued from previous page)

ized taxes. While the Florida commission prescribes actual taxes, the order noted significantly—"Under no circumstances will the amount of accelerated depreciation be included in operating expenses or in reducing the rate base."

FINANCIAL BRIEFS

Stockholder Subscriptions . . . Baltimore Gas & Electric Co stockholders subscribed for 565,772 common shares out of 575,856 offered on the basis of 1-for-10 at $30.25 a share; balance of 10,084 was purchased by underwriting group headed by First Boston Corp . . . Black Hills Power & Light Co common stockholders subscribed for 8,572 shares under their preemptive rights out of 10,950 shares offered; an additional 7,516 shares were asked for under additional rights . . . Public Service Co of Colorado common stockholders subscribed for 269,069 shares out of 275,464 shares offered on a 1-for-10 basis at $38.50 a share; balance 6,395 shares were taken by the underwriters headed by the First Boston Corp.

Southwestern Public Service Co is planning to sell $10 million of bonds and about $3 million of preferred stock privately in March 1956, Chairman H. L. Nichols has announced.

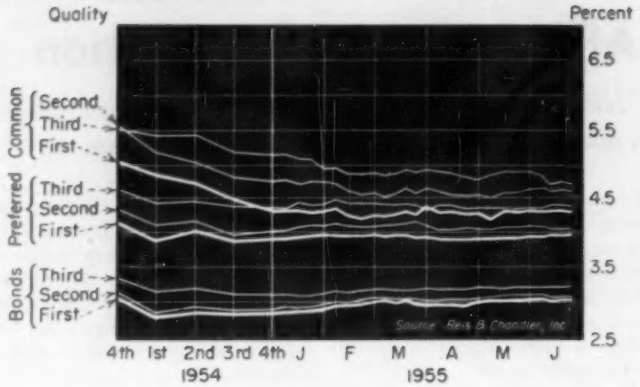
British Columbia Electric Co is planning to sell 220,000 shares of 4¼% cumulative redeemable $50 par preferred stock.

California's Gov Goodwin J. Knight has signed a bill authorizing the Sacramento Municipal Utility District to issue revenue bonds to help pay for an $80 million hydro project on the Upper Rubicon and American Rivers.

Walsenburg, Colo., citizens will vote August 9 on a proposed $1,756,000 bond issue to establish a municipally-owned power system. Funds from the bond issue will be used to buy the Walsenburg plant of the Frontier Power Co and other new equipment.

Wood, Gundy & Co is offering $4.5 million 4¼% 20-year debentures of Great Lakes Power Corp at $100.

Today's Utility Yields—(%)



QUALITY	BONDS			PREFERRED STOCKS			COMMON STOCKS		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
June 23	3.03	3.08	3.22	3.97	4.06	4.38	4.29	4.56	4.71
June 16	3.04	3.08	3.21	3.96	4.08	4.39	4.31	4.58	4.75

Utility Earnings

COMPANY	PERIOD MONTHS ENDED		NET INCOME 1955	NET INCOME 1954	EARNINGS PER COMMON SHARE 1955	EARNINGS PER COMMON SHARE 1954
Carolina Power & Light	12	May	$8,529,297	$7,532,863	$....	$....
Central Vermont Public Service	12	May	1,411,072	1,060,009	1.30(a)	0.96(a)
Detroit Edison	12	May	24,239,437	20,721,630	2.25(a)	1.94(a)
Houston Lighting & Power	12	May	13,278,213	11,014,922	2.21	2.01
Kansas City Power & light	12	May	7,129,883	6,427,061	2.33	2.11
Montana Power and subsidiaries	12	May	7,974,616	7,474,526	2.72	2.62
New York State Electric & Gas	12	May	9,872,720	9,555,731	2.73	2.67
Southern Co, consolidated	12	May	24,065,102	22,634,544	1.33	1.25
Southern Indiana Gas & Electric	12	May	2,632,975	2,249,315	2.43	2.01

Note—(a) Based on average number of shares outstanding.

Utility Financing

COMPANY AND DESCRIPTION	AMOUNT OF OFFERING (000)	OFFERING PRICE	YIELD TO PUBLIC
JUNE 23-29			
BONDS			
Tacoma, Wash.—Cowlitz Power Development Due 1959-89	$15,000	various	1.85-3.10%
SCHEDULED FOR JULY—AUGUST			
BONDS			BID DATE
Gulf States Utilities—bonds or debs	$10,000	.....	.....
PREFERRED STOCK			
Idaho Power—15,000 sh $100 par 4%	$1,500	$100.00	4.00%
Consumers Power—100,000 sh	$10,000	.....	July 21(a)
Northern Indiana Public Service—120,000 sh $100 par	12,000	.....	(b)
COMMON STOCK			
Long Island Lighting—624,170 sh (to be offered commonholders on 1-for-10 basis, record July 1 to expire July 18; additional 33,543 sh to be offered to employees, with a maximum of 200 shs per employee)	.....	.....	.....
Consumers Power—373,689 sh (to be offered commonholders on 1-for-20 basis, record July 21 to expire Aug. 5; unsubscribed stock to employees)	.....	.....	.....

Notes—(a) Morgan Stanley & Co group, underwriters, and (b) Central Republic Co—Blyth & Co—Merrill Lynch, Pierce Fenner & Beane group, underwriters. Issue will be offered during the week of July 11.

This is probably the largest and strongest strain insulator ever made. It is one of an order for 50 such units to be installed in guys for a giant transmitter antenna. Weighing 1340 lbs., it is to be used with a 2¼" steel strand cable, and is designed to break the cable before failure of the insulator—frame or porcelain.

Most of the world's vertical radiators for radio transmission are insulated by Lapp units—both footing and guy insulators . . . which Lapp originated and have produced in considerable volume for nearly 25 years. All have incorporated the Lapp porcelain "compression cone," a design which utilizes to fullest extent the enormous strength of porcelain in compression. When properly mounted, Lapp porcelain attains a compression strength in excess of 100,000 lbs. per square inch.

But basic to such strengths is "proper mounting." In Lapp radio insulators, proper mounting means external attachment of hardware, a design conception which provides that thermal changes between parts, as well as external loading, load the porcelain in compression.

External attachment of hardware, you'll notice, is also the design conception of the Lapp Line Post and Station Post, and a reason why these insulators so greatly outperform multi-part internally-attached-pin insulators.

This is one of the things we mean when we say that Lapp has an understanding of porcelain, its virtues and its strengths as well as its limitations . . . and an ability to design and produce assemblies that assure greater operating security, longer life, lower upkeep.

Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp

STATISTICS

Report on Basic Manufacturing Costs: Fuels Consumed and Energy Purchased

✓ These 11 out of the 20 basic industries (4 more than in 1947) spend more for electricity than for fuels of all kinds

(All figures thousands of $)	1953 Total Cost	1953 Fuels Consumed	1953 Energy Purchased	1947 Total Cost	1947 Fuels Consumed	1947 Energy Purchased
All industries	$5,395,438	$3,675,024	$1,720,414	$3,331,578	$2,376,801	$954,717
Food & kindred products	360,417	215,740	144,677	278,783	170,252	108,531
Tobacco manufactures	7,852	4,554	3,298	6,036	3,862	2,174
✓ Textile mill products	222,953	98,593	124,360	166,492	84,036	82,456
✓ Apparel & related products	67,624	27,720	39,904	29,728	9,161	20,567
Lumber & products (except furniture)	143,312	88,771	54,541	67,798	47,834	19,964
✓ Furniture & fixtures	36,585	16,009	20,576	21,568	9,898	11,670
Paper & allied produtts	284,070	204,164	79,906	198,276	147,670	50,606
✓ Printing & publishing industries	73,654	28,199	45,455	35,205	11,409	23,796
Chemicals & allied products	338,978	147,243	191,735	296,604	211,199	85,405
Petroleum & coal products	224,762	173,474	51,288	96,691	68,398	28,293
✓ Rubber products	60,344	26,602	33,742	45,912	21,227	24,685
Leather & leather products	29,261	15,428	13,833	20,718	11,830	8,888
Stone, clay & glass products	372,046	277,480	94,566	257,748	202,870	54,878
Primary metal products	2,127,081	1,778,020	349,061	1,317,136	1,128,352	188,784
✓ Fabricated metal products	172,216	80,006	92,210	111,008	57,051	53,957
✓ Machinery (except electrical)	217,303	99,345	117,958	146,977	75,019	71,952
✓ Electrical machinery	108,612	41,302	67,310	64,420	29,842	34,578
✓ Transportation equipment	220,531	96,479	124,052	124,695	65,453	59,242
✓ Instruments & related products	24,099	11,886	12,213	12,459	5,696	6,763
✓ Miscellaneous products	103,738	44,009	59,729	33,270	15,742	17,528

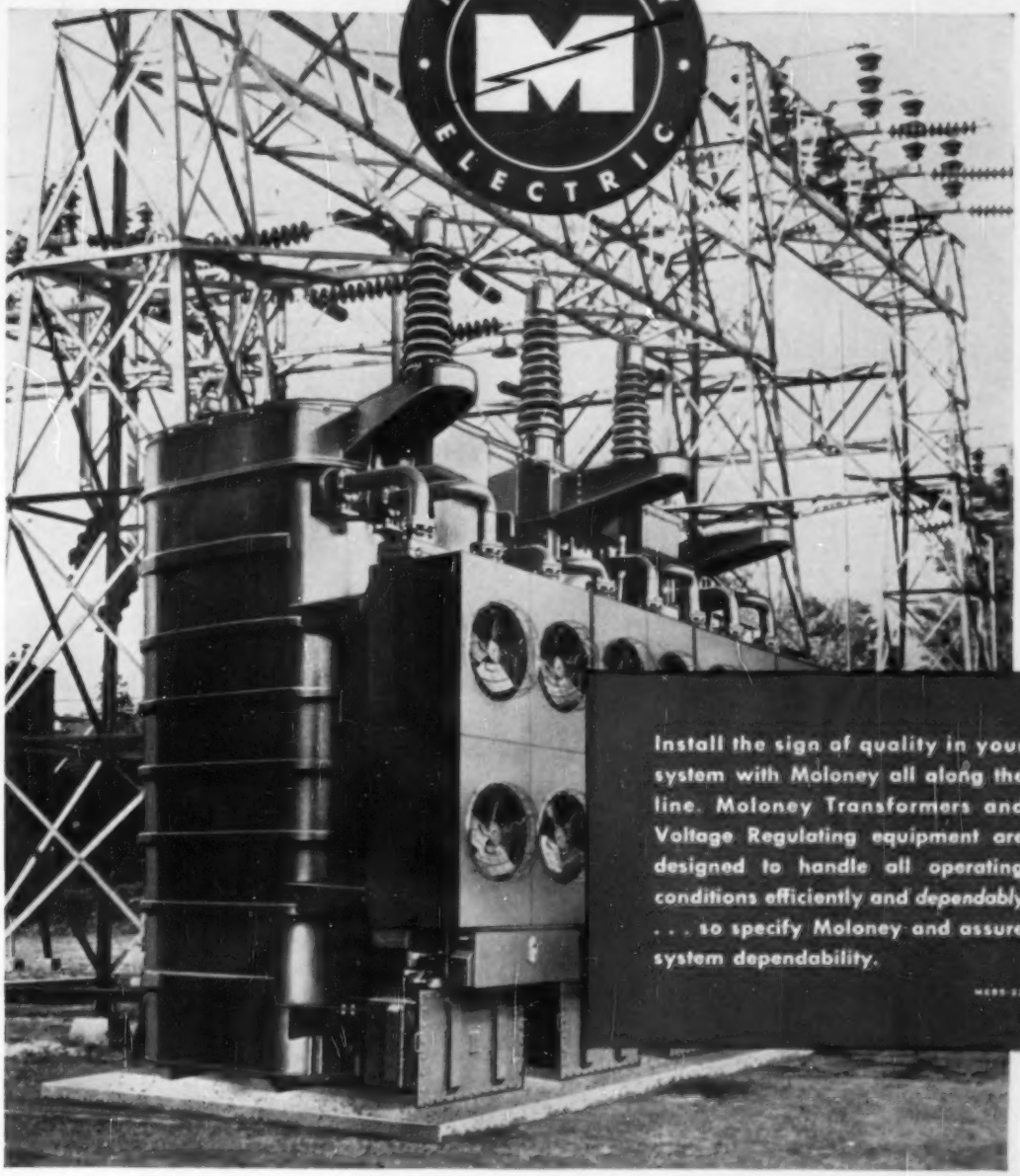
Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	Apr.	105.30	104.93	93.56	12.5
Peak—Class I Systems, million kw	Apr.	82.4	83.4	73.7	11.8
Estimated Dec. '55 Peak	Mar.	96.5	96.4	96.0	0.6
Production—billion kwhr	Apr.	42.03	44.45	36.84	14.1
hydro		10.47	10.40	9.91	5.6
fuel		31.56	34.05	26.93	17.2
Sales—billion kwhr	Apr.	39.56	39.94	34.13	15.9
residential		10.54	11.08	9.57	10.1
commercial		6.14	6.20	5.69	7.9
industrial—includes sales to AEC		20.51	20.36	16.73	22.6
other		2.37	2.29	2.12	11.6
Fuel Consumption	Apr.				
coal—million tons		10.12	11.51	86.68	16.7
oil—million barrels		5.68	6.81	47.78	18.7
gas—billion cu ft		92.82	83.41	91.10	1.9
Net Income Class A & B Co's—$ million	Apr.	105.46	107.80	95.87	10.0
Residential Customers—millions	12 mos.	43.44	43.35	42.15	3.1
revenue per kwhr	ended	2.68¢	2.68¢	2.72¢	−1.5
avg. kwhr per customer	Mar.	2,606	2,587	2,400	8.6
avg. annual bill		$69.84	$69.33	$65.28	7.0

Business Statistics . . .

Indexes: 1947–49 = 100					
FRB Industrial Production	May	137	138	124	10.5
ENR Construction Cost	May	137.0	135.7	129.7	5.6
BLS Cost-of-Living	May	114.2	114.2	115.0	−0.7
NEMA Sales	Apr.				
insulation materials		160	160	124	29.0
electric appliances		105	126	97	8.2
household refrigerators		96	106	73	31.5
Wholesale prices	May				
motors and generators		120.8	120.5	124.1	−2.7
transformers and regulators		127.3	127.3	128.1	−0.6
switchgear and fuses		135.6	135.5	135.1	0.4
GNP—annual rate—$ billion	1st Qtr.	$370.0	$362.0	$355.8	4.0

ASSURE SYSTEM DEPENDABILITY!



Install the sign of quality in your system with Moloney all along the line. Moloney Transformers and Voltage Regulating equipment are designed to handle all operating conditions efficiently and dependably . . . so specify Moloney and assure system dependability.

MOLONEY ELECTRIC COMPANY

Power Transformers • Distribution Transformers • Step Voltage Regulators • Regulating Transformers • Load Tap Changing Transformers • Load Center Transformers • Unit Substations • Network Transformers • Constant Current Transformers • Capacitors • Transformers for Electronics

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

Here's help for the summer "Heat Storm"

ALLIS-CHALMERS DISTRIBUTION TRANSFORMERS

Low-cost Thermalite indicators check distribution transformer loads automatically

WHEN SUMMER HEAT makes loads on your system skyrocket, *Thermalite* indicators on your distribution transformers can save the day. They give plenty of advance warning that overloads are nearing the limits of transformer capability. Their clear indicating light can be seen from a service truck. You get continuous, automatic indication of which units need attention without time-consuming load surveys. And it comes in time to make changes without disturbing service continuity.

How it works

Thermalite indicators do not affect transformer operation in any way. A thermal element located in the top oil, safely away from all live parts, actuates the signal lamp circuit. The brilliant signal lamp remains lit until reset by means of the convenient external handle. The *Thermalite* indicator will not operate on momentary overloads.

Get more from your distribution dollar

You can stretch transformer dollars by taking advantage of the inherent overload capability of distribution transformers on your system. Low-cost *Thermalite* indicators let you use this capability without endangering service continuity. You can get them on Allis-Chalmers distribution transformers 100 kva and smaller, 15 kv and below. Write or call your nearby A-C office, or Allis-Chalmers, Milwaukee 1, Wisconsin, for more information.

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Thermalite is an Allis-Chalmers trademark.

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